Gurugram University
Scheme of Studies and Examination
Bachelor of Technology (SCHEME A1) Semester-1

Sr. No.	Course Code	Course Title	Hours per week			Total Contact Hrs. per week	Credit
			L	T	P		
1.	HSE-101	Communication Skills in English	2	0	0	2	2
2.	BSM-101	Mathematics-I	3	1	0	4	4
3.	BSP-101 OR EEE-101	Physics OR Basic of Electrical and Electronics Engineering	3 3	1 0	0 0	4 OR 3	4 OR 3
4.	CSE-101	Programing for problem solving using C	3	0	0	3	3
5.	ENV-101	Basics of Environmental Science	2	0	0	2	2
6.	HSE-101P	Communication Skills in English (P).	0	0	2	2	1
7.	BSP-101P OR EEE-101P	Physics (P) OR Basic of Electrical and Electronics Engineering (P)	0	0	2	2	1
8.	CSE-101P	Programing for problem solving using C (P)	0	0	2	2	1
9.	CSE-103P OR MEE-102P	Engineering Graphics (Web Design) OR Workshop Practices (P)	1 1	0 0	2 3	3 OR 4	2 OR 2.5
10.	AUS-101	Sports (Audit Course) Compulsory	0	0	2	2*	0
						24+2*	**20/19.5**

Course code	HSE-101				
Category	Humanities and Social Sciences				
Course title	Communication Skills in English				
Scheme and Credits	L	T	P	Credits	
	2	0	0	2	
Class work/ Practical	30 Marks				
Exam	70 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

Objectives of the course:

- **a.** The course will focus on the four integral skills of language, improving the proficiency levels in all of them and to learn to use language as a tool for effective communication.
- **b.** This course will widen the understanding of the learners in all genres of literature (short stories, poetry, autobiographies.) with the help of expository pieces .
- **c.** The course will strive to equip the learner with the ability to express oneself and be understood by others with clarity and precision, in both written and spoken forms.
- **d.** This course will encourage creative use of language through translation, paraphrasing and paragraph writing.
- **e.** Along with the above, the course will also build confidence and encourage the students to use a standard spoken form of English in order to prepare them to face job interviews, workplace and in higher studies.

Unit:1

Remedial English : Parts of speech, Gerunds, Participles and infinitives; Clauses; Sentence constructions (unity; avoidance of choppy and rambling sentences, logic and consistency, conciseness, sequencing of ideas); Sentence errors-agreement between verb and subject, pronoun and antecedents, sequence of tenses, problems involving modifiers (dangling and misplaced modifiers); Shifts in point of view consistency of number and person, tense, mood, voice and subject; Parallelism; Omissions and mixed constructions.

Unit: 2

Vocabulary : Methods of building vocabulary-etmological roots, prefixes and suffixes; Commonly used foreign words and phrases; spelling; words often confused synonyms and homonyms; one word substitutes; verbal idioms.

Unit: 3

Punctuation and Mechanics: End Punctuation; internal Punctuation; Word Punctuation. Comprehension: Abstracting; Summarizing; Observation, Findings and Conclusions; Illustration and Inductive Logic; Deduction and Analogy.

Unit: 4

Presentation: Oral presentation- Extempore, discussion on topics of contemporary relevance, Interviews.

Written Comprehension: The ability to write after listening to and reading select speeches, news bulletins, presentations and answering questions based on what has been heard. Reading the given texts to skim, scan, infer and answer comprehension questions. Reading texts like case studies and project reports for critical assessment and book Review.

Suggested Books:

1. Nitin Bhatnagar and Mamta Bhatnagar, Communicative English for Engineers and Professionals. Pearson Education.
2.Bhatnagar, k. Manmohan. Ed. The Spectrum of Life: An Anthology of Modern Prose. Delhi: Macmillan India Ltd., 2006.
3 C. Murlikrishna & Sunita Mishra, Communication Skills for Engineers, Pearson Ed.
4 Sinha, R.P.Current English Grammar and Usage. OUP.
5.Rizvi, M. Ashraf. Effective Technical Communication. McGraw Hill Education (India) Pvt. Ltd., 2014.
6.Eastwood, John. Oxford Guide to English Grammar.OUP, 2010.
7.Kumar, Sanjay and PushpLata. Communication Skills. OUP, 2011.
8. Raman, Meenakshi and Sangeeta Sharma.CommunicationSkills.NewDelhi:OUP,2011.
9.Hill, L.A.A Guide to Correct English.London:OUP,1965.
10.Oxford Dictionary of English Idioms. New Delhi: OUP, 2009
11*http://yousigma.com/religionandphilosophy/swamivivekananda/thescecretofwork.pdf

Course Code	BSM-101				
Category	Basic Science Course				
Course title	Mathematics-I				
Scheme and Credits	L	T	P	Credits	
	3	1	0	4	
Class work	30 Marks				
Exam	70 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

Objectives of the course

1. To develop logical understanding of the subject
2. To develop mathematical skill so that students are able to apply mathematical methods & principals in solving problem from Engineering fields.
3. To make aware students about the importance and symbiosis between Mathematics and Engineering.

Unit-I

Matrices: Matrices, Vectors: addition and scalar multiplication, Matrix multiplication, Linear systems of equations, Linear Independence, Rank of a matrix, Determinants, Cramer's Rule, Inverse of a matrix, Gauss elimination and Gauss-Jordan elimination.

Unit-II

Vector spaces I: Vector Space, Linear dependence of vectors, Basis, Dimension,Range and kernal, Rank and nullity, Inverse of a linear transformation, Rank nullity theorem,

Unit-III

Vector spaces II: Eigenvalues, Eigenvectors, Symmetric, Skew-symmetric and Orthogonal Matrices, Eigenbases, Diagonalization, Inner product spaces, Gram-Schmidt orthogonalization.

Unit-IV

Calculus: Indeterminate forms and L'Hospital'srule, Rolle's Theorem, Mean value theorems, Taylor's and Maclaurin theorems, Evaluation of definite and improper integrals, Applications of definite integrals to evaluate surface areas and volumes of revolutions, Beta and Gamma functions and their properties.

Reference Books:

1. G.B. Thomas and R.L. Finney, Calculus and Analytic geometry, Pearson Education.

2. Erwin Kreyszig, Advanced Engineering Mathematics, John Wiley & Sons.

3. D. Poole, Linear Algebra: A Modern Introduction, Brooks Cole.

4. Ramana B.V., Higher Engineering Mathematics, Tata McGraw-Hill Publishing Company Limited.

5. N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications.

6. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers.

7. V. Krishnamurthy, V.P. Mainra and J. L. Arora, An introduction to Linear Algebra, Affiliated East– West Press Private limited

Course code	BSP-101				
Category	**Basic Science Course**				
Course title	**Physics**				
Scheme and Credits	**L**	**T**	**P**	**Credits**	
	3	**1**	**0**	**4**	
Class work	**30Marks**				
Exam	**70 Marks**				
Total	**100 Marks**				
Duration of Exam	**03 Hours**				

UNIT – I

Review of Atomic Structure and Statistical Mechanics: - Ideas on Atomic Structure, Quantum Mechanics, The Schrodinger Wave Equation, Statistical Mechanics, Bonding of atoms, Crystalline state

Free electron theory, Density of states and energy band diagrams, Kronig-Penny model (to introduce origin of band gap), Energy bands in solids, E-k diagram, Direct and indirect band gaps, Types of electronic materials: metals, semiconductors, and insulators, Density of states, Occupation probability, Fermi level, Effective mass, Phonons.

UNIT - II

Elemental and compound semiconductors , Intrinsic and extrinsic semiconductors, Dependence of Fermi level on carrier-concentration and temperature (equilibrium carrier statistics), Carrier generation and recombination, Carrier transport: diffusion and drift, The Hall Effect, Einstein Relations, Excess carriers in semiconductors p-n junction, Excess carriers and Quasi-Fermi Levels, Basic equations for semiconductor device operation, Solution of carrier transport equation.

UNIT - III

P-N Junctions: - The abrupt junction (Electric field, potential, capacitance), V-I characteristic of an ideal diode, a real diode. Metal-semiconductor junction (Ohmic and Schottky), Semiconductor materials of interest for optoelectronic devices

Optical transitions in bulk semiconductors: absorption, spontaneous emission, and stimulated emission; Joint density of states, Density of states for photons, Transition rates (Fermi's golden rule), Optical loss and gain; Photovoltaic effect, Exciton, Drude model.

UNIT - IV

Four-point probe and van der Pauw measurements for carrier density, resistivity, and hall mobility; Hot-point probe measurement, capacitance-voltage measurements, parameter extraction from diode I-V characteristics, DLTS, band gap by UV-Vis spectroscopy, absorption/transmission.
Densityofstatesin2D, 1D and 0D (qualitatively). Practical examples of low-dimensional systems such as quantum wells, wires, and dots: design, fabrication, and characterization techniques. Heterojunctions and associated band- diagram.

Suggested reference books

1. Pierret, Semiconductor Device Fundamental,
2. P. Bhattacharya, Semiconductor Optoelectronic Devices, Pearson Education
3. J. Singh, Semiconductor Optoelectronics: Physics and Technology, McGraw-HillInc.
4. B.E.A. Saleh and M.C. Teich, Fundamentals of Photonics, John Wiley & Sons, Inc.
5. S. M. Sze, Semiconductor Devices: Physics and Technology, Wiley
6. A. Yariv and P. Yeh, Photonics: Optical Electronics in Modern Communications, Oxford University Press, New York.
7. Online course: “Semiconductor Optoelectronics” by M R Shenoy on NPTEL
8. Online course: "Optoelectronic Materials and Devices" by Monica Katiyar and Deepak Gupta on NPTEL

Course code	EEE-101				
Category	**Engineering Science Course**				
Course title	**Basics of Electrical and Electronics Engineering**				
Scheme and Credits	L	T	P	Credits	
	3	**0**	**0**	3	
Class work	**30 Marks**				
Exam	**70 Marks**				
Total	**100 Marks**				
Duration of Exam	**03 Hours**				

Objectives of the course

To provide basic knowledge of different elements of electrical and electronics engineering field.
To familiarize the students with the concepts of electrical circuits and network Analysis.

To understand the basics of AC and DC circuits.

To familiarize students to the analysis and design of analog electronic circuits which form the basic building blocks of almost any electronic system.

To introduce p-n junction theory, operation of the semiconductor devices and their use in basic electronic circuits.

Unit: 1
DC Circuits

Role and importance of circuits in Engineering, Concept of fields, charge, current, voltage, energy and their interrelationships. Electrical circuit elements (R, L and C), voltage and current sources(ideal & Controlled),series and parallel circuits, Network reduction: voltage and current division Kirchhoff current and voltage laws with their applications (Nodal and Mesh Analysis), Source transformation - star delta conversion. Superposition theorem, Thevenin and Norton Theorems, Millman,Substitution and Reciprocity theorem.

Unit: 2
AC Circuits

Representation of sinusoidal waveforms, average, peak and rms values, complex representation of impedance, phasor representation, complex power, real power, reactive power, apparent power, power factor and Energy, Analysis of single-phase ac circuits consisting of R, L, C, RL, RC, RLC combinations (series and parallel),Resonance; Introduction to three- phase circuits

Unit: 3

Introduction to p-n junction diode and its pplications. Half wave & full wave rectifiers. clipping and clamping circuits, Varactor, Varistor, Voltage Regulator

Bipolar junction transistors and its biasing BJT operation, BJT voltages and currents, CE, CB and CC characteristics, DC load line and bias point, base bias, emitter feedback bias, collector feedback bias, voltage divider bias, Thermal stability, biasing BJT switching circuits, transistor power dissipation and switching time, Testing of bipolar junction transistor with multi-meter, Reading datasheet of BJT.

Unit: 4

Field Effect Devices: JFET : basic Operation and characteristics, drain and transfer characteristics, pinch off voltage, parameters of JFET: Transconductance (gm), ac drain resistance (rd), amplification factor(μ) ,Small Signal Model & Frequency Limitations. MOSFET: basic operation, depletion and enhancement type, pinch-off voltage, Shockley equation and Small Signal Model of MOSFET, MOS capacitor.

Suggested books:

1. E. Huges, "Electrical Technology", ELBS.
2. J. Millman and C. Halkias, Integrated Electronics, McGraw Hill, 2nd Edition, 2009.
3. M.M. Mano: Digital Logic Design, Phi.

Suggested reference books

1. D. P. Kothari and I. J. Nagrath, "Basic Electrical Engineering", Tata McGraw Hill, 2010.
2. V. Del Toro, "Principles of Electrical engineering", PHI.
3. A. Sedra and C. Smith, Microelectronic Circuits: Theory and Applications, Oxford University Press, 6th Edition, 2013.
4. Boylestad and Nashelsky, "Electronic Devices and Circuit Theory" Pearson publishers, 10th Edition
5. R.P. Jain: Modern Digital Electronics, Tmh.
6. Malvino and Leach, " Digital Principles and Applications", TMH publishers, 8th Edition
7. Tyagi M.S., "Introduction to Semiconductor Materials and Devices", John Wiley & Sons, 1993.
8. Basic Electrical Engineering, A.E. Fitzgerald , David Higginbotham 2009 , Arvin Grabel, Tata McGraw-Hill Publishing Company; 5th Edition.

Course code	CSE-101				
Category	Professional Core Course				
Course title	Programming for Problem Solving Using C				
Scheme and Credits	L	T	P	Credits	
	3	0	0	3	
Class work	30 Marks				
Exam	70 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

Unit 1

Introduction to Programming: Idea of Algorithm: Steps to solve logical and numerical problems. Representation of Algorithm: Flowchart/Pseudocode with examples. C Programming: Keywords, Variables and Data Types: basic, derived and user defined, Type Conversions, Header Files, Basic Input and Output Functions and Statements, Compilation, Syntax and Logical Errors in compilation, Object and Executable Code, Storage Classes, Arithmetic Expressions and Precedence.

Unit 2

Preprocessors, Conditional and Branching Statements, Loops/ Iterative Statements, Writing and evaluation of conditionals and consequent branching.

Unit 3

Arrays (1-D, 2-D), Character Arrays and Strings, Arrays with Pointers, Functions (including using built in libraries), Parameter passing in functions, Call by Value, Call by Reference, Passing arrays to functions, Recursion, as a different way of solving problems. Example programs, such as Finding Factorial, Fibonacci series, Ackerman function etc.

Unit 4

Idea of pointers, Defining pointers, Use of Pointers in self-referential structures, Introduction to Dynamic Memory Allocation and its Methods, Structures, Union, Defining Structures and Array of Structures, File Handling.

Suggested Text Books:

Ajay Mittal, Programming in C, 'A Practical Approach', Pearson Education.
Byron Gottfried, Schaum's Outline of Programming with C, McGraw-Hill
E. Balaguruswamy, Programming in ANSI C, Tata McGraw-Hill
Yashavant Kanetkar, Let Us C, BPB Publication.

Suggested Reference Books

Brian W. Kernighan and Dennis M. Ritchie, The C Programming Language, Prentice Hall of India.

Course code	ENV-101				
Category	Humanities and Social Sciences				
Course title	Basics of Environmental Science				
Scheme and Credits	L	T	P	Credits	
	2	0	0	2	
Class work/Practical	50Marks				
Exam	50Marks				
Total	100Marks				
Duration of Exam	03 Hours				

Course Objective:
To impart the knowledge and awareness for the environmental protection for real-time contribution during an execution of engineering practices in the society.

Unit 1
Environmental studies and Natural Resources:
Definition, scope and importance of environmental studies.
Natural Resources: Renewable and non-renewable resources, and associated problems
(a) Forest resources: Use and over-exploitation, deforestation, Timber extraction, mining, dams and their effects on forests and tribal people.
(b)Water resources: Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dam's benefits and problems.
(c) Mineral Resources: Use and exploitation, environmental effects of extracting and using mineral resources.
(d)Food Resources: World food problems, changes caused by agriculture and over grazing, effects of modern agriculture, fertilizers-pesticides problems, water logging, salinity.
(e) Energy Resources: Growing energy needs, renewable and non renewable energy sources, use of alternate energy sources.

Unit 2
Eco Systems:
Concept of an eco-system, Structure and function of an eco-system, Producers, consumers, decomposers, Energy flow in the ecosystems, Ecological succession, Food chains, food webs and ecological pyramids.
Introduction, types, characteristic features, structure and function of the following ecosystems:
(a) Forest ecosystem

(b) Grass land ecosystem
(c) Desert ecosystem
(d) Aquatic eco systems (ponds, streams, lakes, rivers, oceans, estuaries)

Unit 3
Environmental Pollution:
Definition, Causes, effects and control measures of;
(a) Air pollution
(b)Soil pollution
(c) Marine pollution
(d)Noise pollution
(e) Nuclear hazards
Disaster management: Floods, earth quake, cyclone and landslides.

Unit 4
Social issues and the Environment:
From unsustainable to sustainable development, Urban problems related to energy, Water conservation, rain water harvesting, watershed management.
Environmental ethics: issues and possible solutions, Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust. Environment protection Act, Air (prevention and control of pollution) Act, Water (prevention and control of pollution) Act, Wildlife protection Act, Forest conservation Act, Issues involved in enforcement of environmental legislations.

Recommended Books:
1. Textbook of Environmental studies, Erach Bharucha, UGC.
2. Fundamental concepts in Environmental Studies, D. D. Mishra, S Chand & Co Ltd.
Course Outcomes :
1.To understand the basic concepts of environmental studies and natural resources.
2. To learn about the various eco-systems of nature.
3. To gain knowledge about different types of environmental pollutions and their control measures.
4. To acquire the knowledge about the various social aspects related to the environment.

Communication Skills in English (P)

Course code	HSE-101P				
Category	Humanities and Social Sciences				
Course title	Communication Skills in English (P)				
Scheme and Credits	L	T	P	Credits	
	0	0	2	1	
Class work/ Practical	50 Marks				
Exam	50 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

Lab Activity: The students will acquire basic proficiency in English with special emphasis on listening, comprehension and speaking skills both at social and professional platforms.

(i) Listening comprehension
(ii) Recognition of phonemes in International Phonetic Alphabet
(iii) Self introduction and introduction of another person
(iv) Conversation and dialogues in common everyday situations
(v) Communication at work place (Standard phrases and sentences in various situations)
(vi) Telephonic communication
(vii) Speeches for special occasions (Welcome speeches, Introduction speeches, Felicitation speeches and Farewell speeches)
(viii) Tag Questions
(ix) Formal Presentations on literary texts prescribed in theory paper, Question Formation & Mock Press Conference

Course code	BSP-101P				
Category	**Basic Science Course**				
Course title	**Physics (P)**				
Scheme and Credits	**L**	**T**	**P**	**Credits**	
	0	**0**	**2**	**1**	
Class work	**50 Marks**				
Exam	**50 Marks**				
Total	**100 Marks**				
Duration of Exam	**03 Hours**				

Note: At least 8 experiments are to be performed by the students.

List of Subject related Experiments:

1. To study the forward and reverse characteristics of P-N junction diode.
2. To study the characteristics of Solar cell and find out the fill factor..
3. To study the reverse characteristics of Zener diode and voltage regulation using Zener Diode.
4. To determine Planks constant using photocell.
5. To measure e/m of electron using helical method.
6. To find capacitance of condenser using fleshing and quenching experiment.
7. To find temperature co-efficient of platinum using Callender Griffith bridge.
8. To find out low resistance by Carry Foster bridge.
9. To find resistance of galvanometer by post office box.
10. To measure resistance using four probe methode.
11. To compare the capacitance of two capacitors using De‘Sauty Bridge.

Course code	EEE-101P				
Category	Engineering Science Course				
Course title	**Basics of Electrical and Electronics Engineering (P)**				
Scheme and Credits	L	T	P	Credits	
	0	0	2	1	
Class work	50 Marks				
Exam	**50 Marks**				
Total	**100 Marks**				
Duration of Exam	03 Hours				

Note: At least 8 experiments are to be performed by the students.

List of Subject related Experiments:

1. Verify that resistance of conductor is directly proportional to resistivity and length and inversely proportional to cross- sectional area of the conductor.

2. Verification of Ohm's Law, Kirchhoff current and voltage laws

3. Verification of temperature co-efficient of resistance: (i) Positive for Tungsten and Nichrome and (ii) Negative for carbon.

4. To measure DC voltage and current, AC voltage and current with multi-meter

5. To observe waveforms on oscilloscope, measure basic parameters amplitude and frequency of sine wave and square wave.

6. Obtain VI characteristics of semiconductor rectifier diode, LED, Photo-diode

7. To observe waveform at the output of half wave rectifier with and without filter capacitor.

8. To observe waveform at the output of full wave rectifier with and without filter capacitor.

9. To experimentally plot the input and output characteristics of a given BJT transistor in CE configuration and calculate its various parameters.
10. To experimentally plot the input and output characteristics of a given BJT transistor in CB configuration and calculate its various parameters.
11. To study the transfer and drain characteristics of JFET and calculate its various parameters.
12. To study the transfer and drain characteristics of MOSFET and calculate its various parameters.

Course code	CSE-101P				
Category	Professional Core Course				
Course title	Programming for Problem Solving Using C (P)				
Scheme and Credits	L	T	P	Credits	
	0	0	2	1	
Class work	50 Marks				
Exam	50 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

Note: At least 6 experiments are to be performed by the students.

List of Subject related Experiments:

Laboratory Outcomes

- To formulate the algorithms for simple problems
- To translate given algorithms to a working and correct program
- To be able to correct syntax errors as reported by the compilers
- To be able to identify and correct logical errors encountered at run time
- To be able to write iterative as well as recursive programs
- To be able to represent data in arrays, strings and structures and manipulate them through a program

Tutorial 1: Problem solving using computers:
Lab1: Familiarization with programming environment

Tutorial 2: Variable types and type conversions:
Lab 2: Simple computational problems using arithmetic expressions

Tutorial 3: Branching and logical expressions:
Lab 3: Problems involving if-then-else structures

Tutorial 4: Loops, while and for loops:
Lab 4: Iterative problems e.g., sum of series
Tutorial 5: 1D Arrays
Lab 5: 1D Array manipulation

Tutorial 6: 2D arrays and Strings
Lab 6: Matrix problems, String operations

Tutorial 7: Functions, call by value:
Lab 7: Simple functions

Course code	CSE-103P				
Category	Engineering Science Course				
Coursetitle	Engineering Graphics (Web Designing)				
Scheme and Credits	L	T	P	Credits	
	1	0	2	2	
Class work	50 Marks				
Exam	50 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

Class work

Brief history of Internet, introduction to world wide web, basic principles involved in developing a web site, rules of web designing, web standards, audience requirements, Design concept.

Introduction to elements of HTML, XHTML and CSS.

Javascript as programming language, Language Syntax: Data types, Values, Variables, Expressions and Operators. JavaScript Statements, loops, arrays, strings, methods, Defining and Invoking functions and their closure.

Introduction of Google Web Designer, Firefox, Wordpress, sublime text, Angular.JS, jQuery etc.

Note: At least 8 experiments are to be performed by the students.

Lab work

List of Subject related Experiments:

1. Prepare a survey document of ten website which you like and dislike with various reasons. (Prerequisite)
2. Introduction to basic HTML elements
3. Use table tag to format web page. Also create the Time Table of your class using table tag.
4. Create your profile page i.e. educational details, Hobbies, Achievement, My Ideals etc.
5. Create Style sheet to set formatting for text tags and embed that style sheet on web pages created for your site.

6. Design a web page and embed various multimedia features in the page.
7. Design signup form to validate username, password, and phone numbers etc using Java script.
8. Write a JavaScript program to determine whether a given year is a leap year in the Gregorian calendar.
9. Write a JavaScript program to convert temperatures to and from celsius, Fahrenheit.
10. Installation of Wordpress and designing the wordpress site.
11. Introduction to Dreamweaver and setting up site using Dreamweaver.
12. Submission of Website with Report.

Course code	MEE-102P				
Category	Engineering Science Course				
Course title	Workshop Practices (P)				
Scheme and Credits	L	T	P	Credits	
	1	0	3	2.5	
Class work	50 Marks				
Exam	50 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

Objectives of the course

1. To impart fundamental Knowledge of engineering practices such as fitting, wood working, foundry, machining, welding, etc. for manufacturing a product.
2. To prepare the students to understand the various tools and equipment's used in these processes and their working principle
3. To impart fundamental Knowledge of Lathe machine
4. To able to understand the basic knowledge of various welding processes

Class Work

Introduction:

Introduction to Manufacturing Processes and their Classification, Introduction to additive manufacturing, Industrial Safety.

Machining Shop

Lathe, description of lathe: headstock, tailstock, gearbox, carriage, apron, cutting speed, feed & depth of cut, cutting tools, Chucks: 3 jaw, 4 jaw.

Fitting shop:

Introduction, classification of metals: ferrous and nonferrous, fitting tools: measuring and marking tools, marking schemes for a fitting jobs, cutting tools.

Carpentry shop:

Introduction of carpentry, types of woods, carpentry tolls: measuring tools, marking tolls, cutting tools: saws, chisels, planning tools, drilling tools, striking tools, drilling tools, wood working joints, wood working lathe.

Foundry Shop

Introduction, foundry hand tools, measuring boxes, ladle, moulding, furnaces,Pattern: Types of Pattern and Allowances

Welding Shop

Introduction to welding, Classification of Welding Processes,Arc welding & Gas welding equipment's.

Reference Books:

1. S K Hajra Choudhury, Nirjhar Roy, A K Hajra Choudhury, Elements of workshop Technology (vol. 1&2), Media Promoters.
2. B S Raghuwanshi, A Course in Workshop Technology (manufacturing Process vol. 1& 2) Dhanpat Rai & CO.
3. O.P. Khanna, Workshop Technology. Dhanpat Rai Publication.
4. W A J Chapman, Workshop technology in SI unit (part – 1 &2), Mc Graw Hill Education.
5. M.P. GROOVER, Principles of Modern Manufacturing, Wiley.
6. Kalpakjian, Manufacturing Process for Engineering Materials, Pearson Education India.

Lab Work

List of Experiments

1. To study different types of measuring tools used in metrology and determine least counts of vernier callipers, micrometres and vernier height gauges.

2. To study different types of machine tools (lathe, shaper, planer, milling, drilling machines)

3. To prepare a job on a lathe involving like facing, outside turning, taper turning, step turning, radius making and parting-off.

4. To study different types of fitting tools and marking tools used in fitting practice.

5. To prepare a job made out of MS Flats, making saw – cut filling V-cut taper at the corners.

6. To prepare lay out on a metal sheet by making and prepare rectangular tray pipe shaped components e.g. funnel.

7. To prepare joints for welding suitable for butt welding and lap welding.

8. To study various types of carpentry tools and prepare simple types of at least two wooden joints.

9. To prepare simple engineering components/shapes by forging.

10. To prepare mold and core assembly.

11. To prepare horizontal surface/vertical surface/curved surface/slats or V-grooves on a shaper/planner.

12. To prepare a job involving side and face milling on a milling

13. To prepare a job on CNC Machine/Additive Manufacturing.

Note : At least eight experiments/jobs are to be performed/prepared by the students in the semester.

Gurugram University
Scheme of Studies and Examination
Bachelor of Technology (SCHEME A1) Semester-2

Sr. No.	Course Code	Course Title	Hours per week			Total Contact Hrs. per week	Credit
			L	T	P		
1.	BSM-102	Mathematics-II	3	1	0	4	4
2.	HSV-102	Human Value & Soft Skills	2	0	2	4	3
3.	EEE-101 OR BSP-101	Basic of Electrical and Electronics Engineering OR Physics	3 3	0 1	0 0	3 OR 4	3 OR 4
4.	CSE-102	Data Structure Using C	3	0	0	3	3
5.	CSE-104	Object Oriented Concepts and Python Programming	3	0	0	3	3
6.	EEE-101P OR BSP-101P	Basic of Electrical and Electronics Engineering (P) OR Physics (P).	0	0	2	2	1
7.	CSE-102P	Data Structure Using C (P)	0	0	2	2	1
8.	CSE-104P	Object Oriented Concepts and Python Programming (P)	0	0	2	2	1
9.	MEE-102P OR CSE-103P	Workshop Practices (P) OR Engineering Graphics (Web Designing)	1 1	0 0	3 2	4 OR 3	2.5 OR 2
Total						**27**	**21.5/22**

Course Code	BSM-102				
Category	Basic Science Course				
Course title	Mathematics-II				
Scheme and Credits	L	T	P	Credits	
	3	1	0	4	
Class work	30Marks				
Exam	70 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

Objectives of the course

1. Demonstrate their understanding of mathematical ideas from multiple perspectives.
2. To develop logical understanding of the subject
3. To develop mathematical skill so that students are able to apply mathematical methods & principals in solving problem from Engineering fields.
4. To make aware students about the importance and symbiosis between Mathematics and Engineering.

Unit-I

Random variables and discrete probability distributions: Conditional probability, Probability spaces, Discrete random variables, Independent random variables, Expectation of discrete random variables, Sums of independent random variables, Moments, Variance of a sum, Correlation coefficient, Chebyshev's Inequality, The multinomial distribution, Poisson approximation to the binomial distribution, Infinite sequences of Bernoulli trials.

Unit-II

Continuous and Bivariate probability distribution: Continuous random variables and their properties, Distribution functions and densities, Normal, Exponential and Gamma densities, Bivariate distributions and their properties, Distribution of sums and quotients, Conditional densities, Bayes' rule.

Unit-III

Basic Statistics: Measures of Central tendency: Moments, Skewness and Kurtosis - Probability distributions: Binomial, Poisson and Normal - evaluation of statistical parameters for these three distributions; Correlation and regression – Rank correlation; Curve fitting by the method of least squares- fitting of straight lines, second degree parabolas and more general curves.

Unit-IV

Applied Statistics: Test of significance: Large sample test for single proportion, difference of proportions, single mean, difference of means, and difference of standard deviations; Small samples: Test for single mean, difference of means and correlation coefficients; Test for ratio of variances - Chisquare test for goodness of fit and independence of attributes

Reference Books:

1. Erwin Kreyszig, Advanced Engineering Mathematics, John Wiley & Sons.
2. P. G. Hoel, S. C. Port and C. J. Stone, Introduction to Probability Theory, Universal Book Stall.
3. S. Ross, A First Course in Probability, Pearson Education.
4. W. Feller, An Introduction to Probability Theory and its Applications, Wiley.
5. N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications.
6. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers.
7. Veerarajan T., Engineering Mathematics (for semester III), Tata McGraw-Hill Publishing Company Limited.

Course code	HSV-102				
Category	Humanities and Social Sciences				
Course title	Human Valuesand Soft Skills				
Scheme and Credits	L	T	P	Credits	
	2	0	2	3	
Class work/Practical	30 Marks				
Exam	70 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

Objectives of the course

a. The course aims at developing the desired English language skills of students of Engineering and Technology so that they become proficient in communication to excel in their professional lives. The course has been designed as to enhance their linguistic and communicative competence.
b. Understanding (Clarity) of Human Relationships and Family.
c. Exposure to Issues in Society and nature (larger manmade systems and Nature).

Unit: 1

Motivation and Objectives of Human Values Course, Purpose of Education, Complimentarily of skills and values, how the current education system falls short, Peers Pressure, Social Pressure In various dimensions of life, Concept of Competition and Time Management.

Unit: 2

Concept of Preconditioning, Concept of Natural Acceptance in Human Being, Understanding Relationships, Dealing with anger, Nine universal values in human relationships. Concept of prosperity, idea of Society, Idea of decentralization of politics, economics, education, justice etc., Its comparison with centralized systems, Balance in nature.

Unit: 3

Techniques of Good Writing , Writing self assessment tasks, Precis writing and note making. Paragraph and Essay writing, Article writing and summarizing

Unit: 4

Business Communication: Formal and Informal Letter writing, Statement of Purpose, Job application & CV (summary statement of academic & professional profiles) and Power point presentations through relevant slides.

English Lab Activity: Blog Writing/Creating a Newsletter, Script writing & enacting for a street play. Develop negotiating skills by using appropriate language of courtesy, Recording individual efforts and holding paired interactions and Group Discussions, Preparing and practising for Interviews.

Suggested reference books

Recommended Readings:
1. Bhatnagar, Nitin andMamtaBhatnagar.Communicative English for Engineers and Professionals.Pearson Education, 2013.
2. Swan, Michael.Practical English Usage. OUP, 1995.
3. Gangal, J.K. Practical Course in Spoken English. New Delhi: PHI Learning, 2015.
4. Konar,Nira. Communication Skills for Professionals. New Delhi: PHI Learning Pvt. Ltd., 2009.
5. Bansal, R.K. and J.B. Harrison. Spoken English. Orient Longman, 1983.
6. Sharma, Sangeeta and Binod Mishra. Communication Skills for Engineers and Scientists. Delhi: PHI Learning Pvt. Ltd., 20
7. Annie Leonard, `` The Story of Stuff,'' Free Press
8. Mohandas Karamchand Gandhi,`` The Story of My Experiments with Truth," Beacon Press
9. J Krishnamurthy,`` On Education," Official repository
10. Hermann Hesse ,`` Siddhartha," Bantam Books
11. ThichNhatHanh,`` Old Path White Clouds," Parallex Press
12. On Education - The Mother Aurobindo Ashram Publication

Course code	EEE-101				
Category	**Engineering Science Course**				
Course title	**Basics of Electrical and Electronics Engineering**				
Scheme and Credits	L	T	P	Credits	
	3	**0**	**0**	3	
Class work	**30 Marks**				
Exam	**70 Marks**				
Total	**100 Marks**				
Duration of Exam	**03 Hours**				

Objectives of the course

To provide basic knowledge of different elements of electrical and electronics engineering field.
To familiarize the students with the concepts of electrical circuits and network Analysis.

To understand the basics of AC and DC circuits.

To familiarize students to the analysis and design of analog electronic circuits which form the basic building blocks of almost any electronic system.

To introduce p-n junction theory, operation of the semiconductor devices and their use in basic electronic circuits.

Unit: 1
DC Circuits

Role and importance of circuits in Engineering, Concept of fields, charge, current, voltage, energy and their interrelationships. Electrical circuit elements (R, L and C), voltage and current sources(ideal & Controlled),series and parallel circuits, Network reduction: voltage and current division Kirchhoff current and voltage laws with their applications (Nodal and Mesh Analysis), Source transformation - star delta conversion. Superposition theorem, Thevenin and Norton Theorems, Millman, Substitution and Reciprocity theorem.

Unit: 2
AC Circuits

Representation of sinusoidal waveforms, average, peak and rms values, complex representation of impedance, phasor representation, complex power, real power, reactive power, apparent power, power factor and Energy, Analysis of single-phase ac circuits consisting of R, L, C, RL, RC, RLC combinations (series and parallel),Resonance; Introduction to three- phase circuits

Unit: 3

Introduction to p-n junction diode and its applications. Half wave & full wave rectifiers. clipping and clamping circuits, Varactor, Varistor, Voltage Regulator

Bipolar junction transistors and its biasing BJT operation, BJT voltages and currents, CE, CB and CC characteristics, DC load line and bias point, base bias, emitter feedback bias, collector feedback bias, voltage divider bias, Thermal stability, biasing BJT switching circuits, transistor power dissipation and switching time, Testing of bipolar junction transistor with multi-meter, Reading datasheet of BJT.

Unit: 4

Field Effect Devices: JFET : basic Operation and characteristics, drain and transfer characteristics, pinch off voltage, parameters of JFET: Transconductance (gm), ac drain resistance (rd), amplification factor(μ) ,Small Signal Model & Frequency Limitations. MOSFET: basic operation, depletion and enhancement type, pinch-off voltage, Shockley equation and Small Signal Model of MOSFET, MOS capacitor.

Suggested books:

4. E. Huges, "Electrical Technology", ELBS.
5. J. Millman and C. Halkias, Integrated Electronics, McGraw Hill, 2nd Edition, 2009.
6. M.M. Mano: Digital Logic Design, Phi.

Suggested reference books

9. D. P. Kothari and I. J. Nagrath, "Basic Electrical Engineering", Tata McGraw Hill, 2010.
10. V. Del Toro, "Principles of Electrical engineering", PHI.
11. A. Sedra and C. Smith, Microelectronic Circuits: Theory and Applications, Oxford University Press, 6th Edition, 2013.
12. Boylestad and Nashelsky, "Electronic Devices and Circuit Theory" Pearson publishers, 10th Edition
13. R.P. Jain: Modern Digital Electronics, Tmh.
14. Malvino and Leach, " Digital Principles and Applications", TMH publishers, 8th Edition
15. Tyagi M.S., "Introduction to Semiconductor Materials and Devices", John Wiley & Sons, 1993.
16. Basic Electrical Engineering, A.E. Fitzgerald , David Higginbotham 2009 , Arvin Grabel, Tata McGraw-Hill Publishing Company; 5th Edition.

Course code	BSP-101				
Category	**Basic Science Course**				
Course title	**Physics**				
Scheme and Credits	**L**	**T**	**P**	**Credits**	
	3	**1**	**0**	**4**	
Class work	**30Marks**				
Exam	**70 Marks**				
Total	**100 Marks**				
Duration of Exam	**03 Hours**				

UNIT – I

Review of Atomic Structure and Statistical Mechanics: - Ideas on Atomic Structure, Quantum Mechanics, The Schrodinger Wave Equation, Statistical Mechanics, Bonding of atoms, Crystalline state

Free electron theory, Density of states and energy band diagrams, Kronig-Penny model (to introduce origin of band gap), Energy bands in solids, E-k diagram, Direct and indirect band gaps, Types of electronic materials: metals, semiconductors, and insulators, Density of states, Occupation probability, Fermi level, Effective mass, Phonons.

UNIT - II

Elemental and compound semiconductors , Intrinsic and extrinsic semiconductors, Dependence of Fermi level on carrier-concentration and temperature (equilibrium carrier statistics), Carrier generation and recombination, Carrier transport: diffusion and drift, The Hall Effect, Einstein Relations, Excess carriers in semiconductors p-n junction, Excess carriers and Quasi-Fermi Levels, Basic equations for semiconductor device operation, Solution of carrier transport equation.

UNIT - III

P-N Junctions: - The abrupt junction (Electric field, potential, capacitance), V-I characteristic of an ideal diode, a real diode. Metal-semiconductor junction (Ohmic and Schottky), Semiconductor materials of interest for optoelectronic devices

Optical transitions in bulk semiconductors: absorption, spontaneous emission, and stimulated emission; Joint density of states, Density of states for photons, Transition rates (Fermi's golden rule), Optical loss and gain; Photovoltaic effect, Exciton, Drude model.

UNIT - IV

Four-point probe and van der Pauw measurements for carrier density, resistivity, and hall mobility; Hot-point probe measurement, capacitance-voltage measurements, parameter extraction from diode I-V characteristics, DLTS, band gap by UV-Vis spectroscopy, absorption/transmission.
Densityofstatesin2D, 1D and 0D (qualitatively). Practical examples of low-dimensional systems such as quantum wells, wires, and dots: design, fabrication, and characterization techniques. Heterojunctions and associated band- diagram.

Suggested reference books

1. Pierret, Semiconductor Device Fundamental,
2. P. Bhattacharya, Semiconductor Optoelectronic Devices, Pearson Education
3. J. Singh, Semiconductor Optoelectronics: Physics and Technology, McGraw-HillInc.
4. B.E.A. Saleh and M.C. Teich, Fundamentals of Photonics, John Wiley & Sons, Inc.
5. S. M. Sze, Semiconductor Devices: Physics and Technology, Wiley
6. A. Yariv and P. Yeh, Photonics: Optical Electronics in Modern Communications, Oxford University Press, New York.
7. Online course: “Semiconductor Optoelectronics” by M R Shenoy on NPTEL
8. Online course: "Optoelectronic Materials and Devices" by Monica Katiyar and Deepak Gupta on NPTEL

Course code	CSE-102				
Category	Professional Core Course				
Course title	Data Structures Using C				
Scheme and Credits	L	T	P	Credits	
	3	0	0	3	
Class work	30 Marks				
Exam	70 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

Unit: 1

Introduction

Fundamentals of pointers in C, pointer declaration, passing pointer to functions, pointers and arrays, dynamic memory allocation, Definition of Algorithm, Data Abstraction, Performance Analysis & Measurement, Files and related operations inC. Data Structures vs Data Types.

Searching and SortingTechniques

Searching techniques: Linear and Binary, Sorting techniques: Selection, Bubble, Insertion, Merge sort, Quicksort, List and Table Sorting.

Unit: 2

Linear Data Structures- I

Arrays: Definition of array, Array storage, sparse arrays; Transpose, addition, and multiplication of sparse matrices, Stacks and Queues and their applications, expression evaluation, A mazing problem; multiple stacks and queues in an array, Application of stacks recursion polish expression and their compilation conversion of infix expression to prefix and postfix expression, Tower of Hanoi problem.

Unit: 3

Linear Data Structures- II

Linked Lists; definition, allocation for stacks and queues. Examples of linked lists, polynomial addition, comparison of sequential and linked allocation of storage; inversion, concatenation & copying of the lists. Implementations in C language.

Doubly Linked List: Definition of circular and doubly linked list, header node, insertion and deletion, sparse matrix, representation using doubly linked lists. Examples for application of doubly linked lists; dynamic storage management; node structures, routines for allocation and deallocation, generalized lists and recursive algorithms for copying and comparison oflists.

Unit: 4

Non Linear Data Structures

Trees, Basic concepts and definitions of a tree and binary tree and associated terminology, Binary tree traversal techniques, Binary tree representation of trees, transformation of trees into binary trees, some more operations on binary trees, Binary Search Trees, Heaps and heapsort, threaded binary trees, Graphs: Representation of graphs and their traversal, Minimum cost Spanning Trees.

BOOKS:

1. .Seymour Lipschutz:Data Structures with C, Schaum's outline by TMH
2. E Horowitz and S. Sahni: Fundamentals of Data Structures in C, Second Edition, UniversitiesPress, Hyderabad.
3. R.B. Patel: Expert Data Structures in C, Khanna Publishers,2001.
4. R.L. Kruse: Data Structures & Program Design in C, PHI.
5. D.F. Knuth: The art of Computer Programming Vol 1, Narosa Publications,1985.
6. Byron S. Gottfried & J K Chhabra: Theory and Problems of Programming with C Language, SchaumSeries, TMH,2005.

Course code	**CSE- 104**				
Category	**Professional Core Course**				
Course title	**Object-Oriented and python programming**				
Scheme and Credits	**L**	**T**	**P**	**Credits**	
	3	**0**	**0**	**3**	
Class work	**30 Marks**				
Exam	**70 Marks**				
Total	**100 Marks**				
Duration of Exam	**03 Hours**				

Unit 1.

The concept of data types; variables, assignments; immutable variables; numerical types; arithmetic operators and expressions; comments in the program; understanding error messages; Conditions, boolean logic, logical operators; ranges; Control statements: if-else, loops (for, while); short-circuit (lazy) evaluation; Strings and text files; manipulating files and directories, os and sys modules; text files: reading/writing text and numbers from/to a file; creating and reading a formatted file (csv or tabseparated); String manipulations: subscript operator, indexing, slicing a string.

Unit 2.

Lists, tuples, and dictionaries; basic list operators, replacing, inserting, removing an element; searching and sorting lists; dictionary literals, adding and removing keys, accessing and replacing values; traversing dictionaries; Design with functions: hiding redundancy, complexity; arguments and return values; formal vs actual arguments, named arguments.

Unit 3.

Classes and OOP: classes, objects, attributes and methods; defining classes; design with classes, data modeling; persistent storage of objects; Encapsulation, Information hiding Method, Signature, Classes and Instances, Review of Abstraction, inheritance, polymorphism, operator overloading (_eq_, _str_, etc); abstract classes; exception handling, try block

Unit 4.

Graphical user interfaces; event-driven programming paradigm; tkinter module, creating simple GUI; buttons, labels, entry fields, dialogs; widget attributes - sizes, fonts, colors layouts, nested frames.

Reference Books

1. Phillips, Dusty. *Python 3 object-oriented programming: Build robust and maintainable software with object-oriented design patterns in Python 3.8*. Packt Publishing Ltd, 2018.
2. Steven F. Lott, Mastering Object-Oriented Python - Second Edition, published by Packt.
3. Python Object Oriented Programming Cookbook, published by Packt.
4. Mark Lutz, Programming Python: Powerful Object-Oriented Programming.
5. Irv Kalb, Object-Oriented Python: Master OOP by Building Games and GUIs Kindle Edition

Course code	EEE-101P				
Category	Engineering Science Course				
Course title	**Basics of Electrical and Electronics Engineering (P)**				
Scheme and Credits	L	T	P	Credits	
	0	0	2	1	
Class work	50 Marks				
Exam	**50 Marks**				
Total	**100 Marks**				
Duration of Exam	03 Hours				

Note: At least 8 experiments are to be performed by the students.

List of Subject related Experiments:

1. Verify that resistance of conductor is directly proportional to resistivity and length and inversely proportional to cross- sectional area of the conductor.

2. Verification of Ohm's Law, Kirchhoff current and voltage laws

3. Verification of temperature co-efficient of resistance: (i) Positive for Tungsten and Nichrome and (ii) Negative for carbon.

4. To measure DC voltage and current, AC voltage and current with multi-meter

5. To observe waveforms on oscilloscope, measure basic parameters amplitude and frequency of sine wave and square wave.

6. Obtain VI characteristics of semiconductor rectifier diode, LED, Photo-diode

7. To observe waveform at the output of half wave rectifier with and without filter capacitor.

8. To observe waveform at the output of full wave rectifier with and without filter capacitor.

9. To experimentally plot the input and output characteristics of a given BJT transistor in CE configuration and calculate its various parameters.
10. To experimentally plot the input and output characteristics of a given BJT transistor in CB configuration and calculate its various parameters.
11. To study the transfer and drain characteristics of JFET and calculate its various parameters.
12. To study the transfer and drain characteristics of MOSFET and calculate its various parameters.

Course code	BSP-101P				
Category	**Basic Science Course**				
Course title	**Physics (P)**				
Scheme and Credits	**L**	**T**	**P**	**Credits**	
	0	**0**	**2**	**1**	
Class work	**50 Marks**				
Exam	**50 Marks**				
Total	**100 Marks**				
Duration of Exam	**03 Hours**				

Note: At least 8 experiments are to be performed by the students.

List of Subject related Experiments:

1. To study the forward and reverse characteristics of P-N junction diode.
2. To study the characteristics of Solar cell and find out the fill factor..
3. To study the reverse characteristics of Zener diode and voltage regulation using Zener Diode.
4. To determine Planks constant using photocell.
5. To measure e/m of electron using helical method.
6. To find capacitance of condenser using fleshing and quenching experiment.
7. To find temperature co-efficient of platinum using Callender Griffith bridge.
8. To find out low resistance by Carry Foster bridge.
9. To find resistance of galvanometer by post office box.
10. To measure resistance using four probe methode.
11. To compare the capacitance of two capacitors using De‘Sauty Bridge.

Course code	CSE-102P				
Category	Professional Core Course				
Course title	Data Structures Using C (P)				
Scheme and Credits	L	T	P	Credits	
	0	0	2	1	
Class work	50 Marks				
Exam	50 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

Note: At least 8 experiments are to be performed by the students.

List of Subject related Experiments:

1. Write a program to search an element in a two-dimensional array using linear search.
2. Using iteration & recursion concepts write programs for finding the element in the array using Binary Search Method
3. Write a program to perform following operations on tables using functions only
(a) Addition (b) Subtraction (c) Multiplication (d) Transpose
4. Using iteration & recursion concepts write the programs for Quick Sort Technique
5. Write a program to implement the various operations on string such as length of string concatenation, reverse of a string & copy of a string to another.
6. Write a program for swapping of two numbers using 'call by value' and 'call by reference strategies.
7. Write a program to implement binary search tree.
8. (Insertion and Deletion in Binary search Tree)
9. Write a program to create a linked list & perform operations such as insert, delete, update, reverse in the link list
10. Write the program for implementation of a file and performing operations such as insert, delete, update a record in the file.
11. Create a linked list and perform the following operations on it
(a) add a node (b) Delete a node

Course code	CSE-104P				
Category	Professional Core Course				
Course title	Object Oriented Concepts and Python Programming (P)				
Scheme and Credits	L	T	P	Credits	
	0	0	2	1	
Class work	50Marks				
Exam	50 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

List of Subject related Experiments:

1. Basic building blocks of a Python program (variables, conditional statements, loops, libraries, functions, errors).
2. Data structures (trees, dictionaries, tuples)
3. Object Oriented programming (classes, objects, inheritance, polymorphism, abstract classes).
4. PyQt for creating graphical user interfaces for interactive programs
5. NumPy (Matrices, vectors, linear algebra)
6. SciPy (Package for numerical computations)
7. Matplotlib (Plotting)
8. Interactive Python (IPython)

Course code	MEE-102P				
Category	Engineering Science Course				
Course title	Workshop Practices (P)				
Scheme and Credits	L	T	P	Credits	
	1	0	3	2.5	
Class work	50 Marks				
Exam	50 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

Objectives of the course

5. To impart fundamental Knowledge of engineering practices such as fitting, wood working, foundry, machining, welding, etc. for manufacturing a product.
6. To prepare the students to understand the various tools and equipment's used in these processes and their working principle
7. To impart fundamental Knowledge of Lathe machine
8. To able to understand the basic knowledge of various welding processes

Class Work

Introduction:

Introduction to Manufacturing Processes and their Classification, Introduction to additive manufacturing, Industrial Safety.

Machining Shop

Lathe, description of lathe: headstock, tailstock, gearbox, carriage, apron, cutting speed, feed & depth of cut, cutting tools, Chucks: 3 jaw, 4 jaw.

Fitting shop:

Introduction, classification of metals: ferrous and nonferrous, fitting tools: measuring and marking tools, marking schemes for a fitting jobs, cutting tools.

Carpentry shop:

Introduction of carpentry, types of woods, carpentry tolls: measuring tools, marking tolls, cutting tools: saws, chisels, planning tools, drilling tools, striking tools, drilling tools, wood working joints, wood working lathe.

Foundry Shop

Introduction, foundry hand tools, measuring boxes, ladle, moulding, furnaces,Pattern: Types of Pattern and Allowances

Welding Shop

Introduction to welding, Classification of Welding Processes,Arc welding & Gas welding equipment's.

Reference Books:

7. S K Hajra Choudhury, Nirjhar Roy, A K Hajra Choudhury, Elements of workshop Technology (vol. 1&2), Media Promoters.
8. B S Raghuwanshi, A Course in Workshop Technology (manufacturing Process vol. 1& 2) Dhanpat Rai & CO.
9. O.P. Khanna, Workshop Technology. Dhanpat Rai Publication.
10. W A J Chapman, Workshop technology in SI unit (part – 1 &2), Mc Graw Hill Education.
11. M.P. GROOVER, Principles of Modern Manufacturing, Wiley.
12. Kalpakjian, Manufacturing Process for Engineering Materials, Pearson Education India.

Lab Work

List of Experiments

1. To study different types of measuring tools used in metrology and determine least counts of vernier callipers, micrometres and vernier height gauges.

2. To study different types of machine tools (lathe, shaper, planer, milling, drilling machines)

3. To prepare a job on a lathe involving like facing, outside turning, taper turning, step turning, radius making and parting-off.

4. To study different types of fitting tools and marking tools used in fitting practice.

5. To prepare a job made out of MS Flats, making saw – cut filling V-cut taper at the corners.

6. To prepare lay out on a metal sheet by making and prepare rectangular tray pipe shaped components e.g. funnel.

7. To prepare joints for welding suitable for butt welding and lap welding.

8. To study various types of carpentry tools and prepare simple types of at least two wooden joints.

9. To prepare simple engineering components/shapes by forging.

10. To prepare mold and core assembly.

11. To prepare horizontal surface/vertical surface/curved surface/slats or V-grooves on a shaper/planner.

12. To prepare a job involving side and face milling on a milling

13. To prepare a job on CNC Machine/Additive Manufacturing.

Note : At least eight experiments/jobs are to be performed/prepared by the students in the semester.

Course code	CSE-103P				
Category	Engineering Science Course				
Coursetitle	Engineering Graphics (Web Designing)				
Scheme and Credits	L	T	P	Credits	
	1	0	2	2	
Class work	50 Marks				
Exam	50 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

Class work

Brief history of Internet, introduction to world wide web, basic principles involved in developing a web site, rules of web designing, web standards, audience requirements, Design concept.

Introduction to elements of HTML, XHTML and CSS.

Javascript as programming language, Language Syntax: Data types, Values, Variables, Expressions and Operators. JavaScript Statements, loops, arrays, strings, methods, Defining and Invoking functions and their closure.

Introduction of Google Web Designer, Firefox, Wordpress, sublime text, Angular.JS, jQuery etc.

Note: At least 8 experiments are to be performed by the students.

Lab work

List of Subject related Experiments:

1. Prepare a survey document of ten website which you like and dislike with various reasons. (Prerequisite)
2. Introduction to basic HTML elements
3. Use table tag to format web page. Also create the Time Table of your class using table tag.
4. Create your profile page i.e. educational details, Hobbies, Achievement, My Ideals etc.
5. Create Style sheet to set formatting for text tags and embed that style sheet on web pages created for your site.

6. Design a web page and embed various multimedia features in the page.
7. Design signup form to validate username, password, and phone numbers etc using Java script.
8. Write a JavaScript program to determine whether a given year is a leap year in the Gregorian calendar.
9. Write a JavaScript program to convert temperatures to and from celsius, Fahrenheit.
10. Installation of Wordpress and designing the wordpress site.
11. Introduction to Dreamweaver and setting up site using Dreamweaver.
12. Submission of Website with Report.

Gurugram University
Scheme of Studies and Examination
Bachelor of Technology (SCHEME A2) Semester-1

Sr. No.	Course Code	Course Title	Hours per week			Total Contact Hrs. per week	Credit
			L	T	P		
1.	HSE-101	Communication Skills in English	2	0	0	2	2
2.	BSM-103	Mathematics-I	3	1	0	4	4
3.	BSP-103 OR EEE-103	Physics OR Basics of Electrical Engineering	3 3	1 0	0 0	4 OR 3	4 OR 3
4.	CSE-101	Programming for problem solving using C	3	0	0	3	3
5.	ENV-101	Basics of Environmental Science	2	0	0	2	2
6.	HSE-101P	Communication Skills in English (P)	0	0	2	2	1
7.	BSP-103P OR EEE-103P	Physics (P) OR Basics of Electrical Engineering (P)	0	0	2	2	1
8.	CSE-101P	Programming for problem solving using C (P)	0	0	2	2	1
9.	MEE-102P	Workshop Practices (P)	1	0	3	4	2.5
10.	AUS-101	Sports (Audit Course) Compulsory	0	0	2	2*	0
Total						**25/ 24+2***	**20.5/19.5**

Course code	HSE-101				
Category	Humanities and Social Sciences				
Course title	Communication Skills in English				
Scheme and Credits	L	T	P	Credits	
	2	0	0	2	
Class work/ Practical	30 Marks				
Exam	70 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

Objectives of the course:

- **a.** The course will focus on the four integral skills of language, improving the proficiency levels in all of them and to learn to use language as a tool for effective communication.
- **b.** This course will widen the understanding of the learners in all genres of literature (short stories, poetry, autobiographies.) with the help of expository pieces .
- **c.** The course will strive to equip the learner with the ability to express oneself and be understood by others with clarity and precision, in both written and spoken forms.
- **d.** This course will encourage creative use of language through translation, paraphrasing and paragraph writing.
- **e.** Along with the above, the course will also build confidence and encourage the students to use a standard spoken form of English in order to prepare them to face job interviews, workplace and in higher studies.

Unit:1

Remedial English : Parts of speech, Gerunds, Participles and infinitives; Clauses; Sentence constructions (unity; avoidance of choppy and rambling sentences, logic and consistency, conciseness, sequencing of ideas); Sentence errors-agreement between verb and subject, pronoun and antecedents, sequence of tenses, problems involving modifiers (dangling and misplaced modifiers); Shifts in point of view consistency of number and person, tense, mood, voice and subject; Parallelism; Omissions and mixed constructions.

Unit: 2

Vocabulary : Methods of building vocabulary-etmological roots, prefixes and suffixes; Commonly used foreign words and phrases; spelling; words often confused synonyms and homonyms; one word substitutes; verbal idioms.

Unit: 3

Punctuation and Mechanics: End Punctuation; internal Punctuation; Word Punctuation. Comprehension: Abstracting; Summarizing; Observation, Findings and Conclusions; Illustration and Inductive Logic; Deduction and Analogy.

Unit: 4

Presentation: Oral presentation- Extempore, discussion on topics of contemporary relevance, Interviews.

Written Comprehension: The ability to write after listening to and reading select speeches, news bulletins, presentations and answering questions based on what has been heard. Reading the given texts to skim, scan, infer and answer comprehension questions. Reading texts like case studies and project reports for critical assessment and book Review.

Suggested Books:

1. Nitin Bhatnagar and Mamta Bhatnagar, Communicative English for Engineers and Professionals. Pearson Education.
2.Bhatnagar, k. Manmohan.Ed. The Spectrum of Life: An Anthology of Modern Prose. Delhi: Macmillan India Ltd., 2006.
3 C. Murlikrishna& Sunita Mishra, Communication Skills for Engineers, Pearson Ed.
4 Sinha, R.P.Current English Grammar and Usage. OUP.
5.Rizvi, M. Ashraf.Effective Technical Communication. McGraw Hill Education (India) Pvt. Ltd., 2014.
6.Eastwood, John.Oxford Guide to English Grammar.OUP, 2010.
7.Kumar, Sanjay and PushpLata. Communication Skills. OUP, 2011.
8. Raman, Meenakshi and Sangeeta Sharma.CommunicationSkills.NewDelhi:OUP,2011.
9.Hill, L.A.A Guide to Correct English.London:OUP,1965.
10.Oxford Dictionary of English Idioms. New Delhi: OUP, 2009
11*http://yousigma.com/religionandphilosophy/swamivivekananda/thescecretofwork.pdf

Course code	BSM-103				
Category	Basic Science Course				
Course title	Mathematics-I				
Scheme and Credits	L	T	P	Credits	
	3	1	0	4	
Class work	30 Marks				
Exam	70 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

Objectives of the course

1. To develop logical understanding of the subject
2. To develop mathematical skill so that students are able to apply mathematical methods & principals in solving problem from Engineering fields.
3. To make aware students about the importance and symbiosis between Mathematics and Engineering.

Unit-I

Matrices & Its Application:

Elementary Matrices, Elementary Transformations, Inverse using elementary transformations, Rank of a matrix, Normal form of a matrix, Linear dependence and independence of vectors, Consistency of linear system of equations, Linear and Orthogonal Transformations, Eigenvalues and Eigenvectors, Properties of eigenvalues, Cayley-Hamilton Theorem, Diagonalization of Matrices.

Unit-II

Sequences and Series:

Convergence of sequence and series, Tests for convergence, Power series: Taylor's series, series for exponential, trigonometric and logarithm functions, Fourier series: Half range sine and cosine series, Parseval's theorem.

Unit-III

Differential Calculus: Limit, Continuity and Differentiability of function of single variable, Successive Differentiation, Leibnitz Theorem, Taylor's and Maclaurin's Series for Single

Variable function, Partial derivatives, Homogeneous functions, Euler's Theorem, Jacobian, Maxima-Minima of function of two variables, Lagrange's Method of undetermined multipliers.

Unit-IV

Integral Calculus: Basic concepts of integration and properties of definite integrals, Applications of single integration to find volume of solids and surface area of solids of revolution, Double integral, Change of order of integration, Double integral in Polar Co-ordinates, Applications of double integral to find area enclosed by plane curves, Triple integral, Beta and Gamma functions.

Reference Books:

1. G.B. Thomas and R.L. Finney, Calculus and Analytic geometry, Pearson Education.

2. Erwin Kreyszig, Advanced Engineering Mathematics, John Wiley & Sons.

3. D. Poole, Linear Algebra: A Modern Introduction, Brooks Cole.

4. Ramana B.V., Higher Engineering Mathematics, Tata McGraw-Hill Publishing Company Limited.

5. N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications.

6. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers.

7. V. Krishnamurthy, V.P. Mainra and J. L. Arora, An introduction to Linear Algebra, Affiliated East– West Press Private limited

Course code	BSP-103				
Category	**Basic Science Course**				
Course title	**Physics**				
Scheme and Credits	**L**	**T**	**P**	**Credits**	
	3	**1**	**0**	**4**	
Class work	**30 Marks**				
Exam	**70 Marks**				
Total	**100 Marks**				
Duration of Exam	**03 Hours**				

Objectives of the course

1. To impart knowledge of basic concepts in applied physics
2. To enhance the analytical capability of the engineering students.
3. To givea balance account of the fundamentals of Physics as well as some of recent developments in this area best suited to the Engineering applications in different branches and to provide the knowledge and methodology necessary for solving problems in the field of engineering.

UNIT – I

Electrostatics in vacuum and linear dielectric medium

Calculation of electric field and electrostatic potential for a charge distribution; Divergence and curl of electrostatic field; Laplace's and Poisson's equations for electrostatic potential Boundary conditions of electric field and electrostatic potential; energy of a charge distribution and its expression in terms of electric field. Electrostatic field and potential of a dipole. Bound charges due to electric polarization; Electric displacement; boundary conditions on displacement.

UNIT – II

Electromagnetism and Magnetic Properties of Materials

Laws of electrostatics, electric current and the continuity equation, laws of magnetism. Ampere's Faraday's laws. Maxwell's equations. Polarisation, permeability and dielectric constant, polar and non-polar dielectrics, applications of dielectric Magnetisation, permeability and susceptibility, classification of magnetic materials, ferromagnetism, magnetic domains and hysteresis, applications.

UNIT – III

Wave Optics and Lasers

Wave Optics: Huygens' principle, superposition of waves and interference of light by wave-front splitting and amplitude splitting; Young's double slit experiment, Newton's rings, Michelson

interferometer. Fraunhofer diffraction from a single slit and a circular aperture, the Rayleigh criterion for limit of resolution and its application to vision; Diffraction gratings and their resolving power.
Lasers: Einstein's theory of matter radiation interaction and A and B coefficients; amplification of light by population inversion, different types of lasers: gas lasers (He-Ne, CO), solid-state lasers (ruby, Neodymium), dye lasers; Properties of laser beams: mono-chromaticity.

UNIT – IV
Introduction to Solids and Semiconductors
Free electron theory of metals, Fermi level, density of statesin1, 2 and 3 dimensions, Bloch's theorem for particles in a periodic potential, Kronig-Penney model and origin of energy bands. Types of electronic materials: metals, semiconductors, and insulators. Intrinsic and extrinsic semiconductors, Dependence of Fermi level on carrier-concentration and temperature (equilibrium carrier statistics), Carrier generation and recombination, Carrier transport: diffusion and drift, p -n junction.

Suggested Reference books

1. E. Hecht, "Optics", Pearson Education
2. D. J. Griffiths, "Quantum mechanics", Pearson Education
3. B.G. Streetman, "Solid State Electronic Devices", Pearson Education
4. G. Main, "Vibrations and waves in physics", Cambridge University Press
5. H. J. Pain, "The physics of vibrations and waves", Wiley
6. A. Ghatak, "Optics", McGraw Hill Education,
7. O. Svelto, "Principles of Lasers", Springer Science & Business Media,
8. R. Robinett, "Quantum Mechanics", OUP Oxford
9. D. McQuarrie, "Quantum Chemistry", University Science Books
10. D. A. Neamen, "Semiconductor Physics and Devices", Times Mirror High Education Group, Chicago
11. E.S. Yang, "Microelectronic Devices", McGraw Hill, Singapore

Course code	EEE-103				
Category	**Engineering Science Course**				
Course title	**Basics of Electrical Engineering**				
Scheme and Credits	L	T	P	Credits	
	3	**0**	**0**	3	
Class work	**30 Marks**				
Exam	**70 Marks**				
Total	**100 Marks**				
Duration of Exam	**03 Hours**				

Objectives of the course

To explain the laws used in the analysis of DC and AC circuits.
To explain the behavior of circuit elements in single-phase circuits.
To explain the construction and operation of transformers, DC generators and motors, Induction motors, and synchronous generators.

Unit: 1.
DC Circuits:
Concept of electrical fields, charge, current, voltage, energy and their inter relationships. Electrical networks elements (R, L and C), voltage and current sources (ideal & controlled), series and parallel circuits.

Classification of electrical networks, Ohm's law, Kirchhoff's law and their applications for network solutions (Nodal and Mesh Analysis), Source transformation, star delta conversion. Network theorems: Superposition theorem, Thevenin and Norton Theorems, Millman Theorem, maximum power transfer theorem, Substitution and Reciprocity theorems.

Unit: 2

Electrostatics: Electrostatics field, electric flux density, electric field strength, absolute permittivity, relative permittivity, capacitance and capacitor, composite dielectric capacitors, capacitors in series and parallel, energy stored in capacitors, charging and discharging of capacitors and time constant.

AC Fundamentals: Sinusoidal voltages and currents, their mathematical and graphical representation, concept of instantaneous, peak (maximum), average and R.M.S. values, frequency,
cycle, period, peak factor and form factor, phase difference, lagging, leading and in phase quantities and phasor representation. Rectangular and polar representation of phasors.

Unit: 3
AC Circuits: Study of Single phase series and parallel R-L, R-C, R-L-C circuits, concept of impedance and admittance for different combinations, wave form and relevant voltage current phasor diagrams.

Concept of active power, reactive power, apparent power, complex power, power factor and resonance in series and parallel RLC circuit. Q- factor and bandwith. Introduction to three- phase circuits.

Single phase transformers: Construction, principle of working, E.M.F. equation, voltage and current ratios. Losses, definition of regulation and efficiency, determination of these by direct loading method. autotransformers and dimmer stats

Unit: 4

Electrical Machines: Introduction, Generation of rotating magnetic fields. Construction and working of separately excited DC motor, Single-phase induction motor, Three-phase induction motor and Synchronous generators.

Safety measures: Electric Shock, Earthing and its types, Safety Precautions to avoid shock, and Working principle of Fuse and Miniature circuit breaker (MCB), Residual Current Circuit Breaker (RCCB).

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Suggested books:

1. E. Huges, "Electrical Technology", ELBS.

Suggested reference books

1. D. P. Kothari and I. J. Nagrath, "Basic Electrical Engineering", Tata McGraw Hill, 2010.
2. V. Del Toro, "Principles of Electrical engineering", PHI.
3. Basic Electrical Engineering, A.E. Fitzgerald , David Higginbotham 2009 , Arvin Grabel, Tata McGraw-Hill Publishing Company; 5th Edition.

Course code	CSE-101				
Category	Professional Core Course				
Course title	Programming for Problem Solving Using C				
Scheme and Credits	L	T	P	Credits	
	3	0	0	3	
Class work	30 Marks				
Exam	70 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

Unit 1

Introduction to Programming: Idea of Algorithm: Steps to solve logical and numerical problems. Representation of Algorithm: Flowchart/Pseudocode with examples. C Programming: Keywords, Variables and Data Types: basic, derived and user defined, Type Conversions, Header Files, Basic Input and Output Functions and Statements, Compilation, Syntax and Logical Errors in compilation, Object and Executable Code, Storage Classes, Arithmetic Expressions and Precedence.

Unit 2

Preprocessors, Conditional and Branching Statements, Loops/ Iterative Statements, Writing and evaluation of conditionals and consequent branching.

Unit 3

Arrays (1-D, 2-D), Character Arrays and Strings, Arrays with Pointers, Functions (including using built in libraries), Parameter passing in functions, Call by Value, Call by Reference, Passing arrays to functions, Recursion, as a different way of solving problems. Example programs, such as Finding Factorial, Fibonacci series, Ackerman function etc.

Unit 4

Idea of pointers, Defining pointers, Use of Pointers in self-referential structures, Introduction to Dynamic Memory Allocation and its Methods, Structures, Union, Defining Structures and Array of Structures, File Handling.

Suggested Text Books:

Ajay Mittal, Programming in C, 'A Practical Approach', Pearson Education.
Byron Gottfried, Schaum's Outline of Programming with C, McGraw-Hill
E. Balaguruswamy, Programming in ANSI C, Tata McGraw-Hill
Yashavant Kanetkar, Let Us C, BPB Publication.

Suggested Reference Books

Brian W. Kernighan and Dennis M. Ritchie, The C Programming Language, Prentice Hall of India.

Course code	ENV-101				
Category	Humanities and Social Sciences				
Course title	Basics of Environmental Science				
Scheme and Credits	L	T	P	Credits	
	2	0	0	2	
Class work/Practical	50Marks				
Exam	50Marks				
Total	100Marks				
Duration of Exam	03 Hours				

Course Objective:
To impart the knowledge and awareness for the environmental protection for real-time contribution during an execution of engineering practices in the society.

Unit 1
Environmental studies and Natural Resources:
Definition, scope and importance of environmental studies.
Natural Resources: Renewable and non-renewable resources, and associated problems
(a) Forest resources: Use and over-exploitation, deforestation, Timber extraction, mining, dams and their effects on forests and tribal people.
(b)Water resources: Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dam's benefits and problems.
(c) Mineral Resources: Use and exploitation, environmental effects of extracting and using mineral resources.
(d)Food Resources: World food problems, changes caused by agriculture and over grazing, effects of modern agriculture, fertilizers-pesticides problems, water logging, salinity.
(e) Energy Resources: Growing energy needs, renewable and non renewable energy sources, use of alternate energy sources.

Unit 2
Eco Systems:
Concept of an eco-system, Structure and function of an eco-system, Producers, consumers, decomposers, Energy flow in the ecosystems, Ecological succession, Food chains, food webs and ecological pyramids.
Introduction, types, characteristic features, structure and function of the following ecosystems:
(a) Forest ecosystem
(b) Grass land ecosystem
(c) Desert ecosystem
(d) Aquatic eco systems (ponds, streams, lakes, rivers, oceans, estuaries)

Unit 3

Environmental Pollution:

Definition, Causes, effects and control measures of;

(a) Air pollution

(b)Soil pollution

(c) Marine pollution

(d)Noise pollution

(e) Nuclear hazards

Disaster management: Floods, earth quake, cyclone and landslides.

Unit 4

Social issues and the Environment:

From unsustainable to sustainable development, Urban problems related to energy, Water conservation, rain water harvesting, watershed management.

Environmental ethics: issues and possible solutions, Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust. Environment protection Act, Air (prevention and control of pollution) Act, Water (prevention and control of pollution) Act, Wildlife protection Act, Forest conservation Act, Issues involved in enforcement of environmental legislations.

Recommended Books:

1. Textbook of Environmental studies, Erach Bharucha, UGC.

2. Fundamental concepts in Environmental Studies, D. D. Mishra, S Chand & Co Ltd.

Course Outcomes :

1.To understand the basic concepts of environmental studies and natural resources.

2. To learn about the various eco-systems of nature.

3. To gain knowledge about different types of environmental pollutions and their control measures.

4. To acquire the knowledge about the various social aspects related to the environment.

Communication Skills in English (P)

Course code	HSE-101P				
Category	Humanities and Social Sciences				
Course title	Communication Skills in English (P)				
Scheme and Credits	L	T	P	Credits	
	0	0	2	1	
Class work/ Practical	50 Marks				
Exam	50 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

Lab Activity: The students will acquire basic proficiency in English with special emphasis on listening, comprehension and speaking skills both at social and professional platforms.

(i) Listening comprehension
(ii) Recognition of phonemes in International Phonetic Alphabet
(iii) Self introduction and introduction of another person
(iv) Conversation and dialogues in common everyday situations
(v) Communication at work place (Standard phrases and sentences in various situations)
(vi) Telephonic communication
(vii) Speeches for special occasions (Welcome speeches, Introduction speeches, Felicitation speeches and Farewell speeches)
(viii) Tag Questions
(ix) Formal Presentations on literary texts prescribed in theory paper, Question Formation & Mock Press Conference

PHYSICS Lab

Course code	BSP-103P				
Category	**Basic Science Course**				
Course title	**Physics (P)**				
Scheme and Credits	**L**	**T**	**P**	**Credits**	
	0	**0**	**2**	**1**	
Class work	**50 Marks**				
Exam	**50 Marks**				
Total	**100 Marks**				
Duration of Exam	**03 Hours**				

Note: At least 8 experiments are to be performed by the students.

List of Subject related Experiments:

1. To find out wavelength of monochromatic light using Newton's ring experiment.
2. To find out wavelength of monochromatic light using Diffraction grating.
3. To find out wavelength of monochromatic light using Freshnel's bi-prism
4. To study interference phenomena using Michelson's Interferometer and to find out wavelength of monochromatic light.
5. To study Hall effect in semiconductors and measure the Hall coefficient.
6. To find frequency of AC mains using sonometer.
7. To study the magnetic properties of materials using B-H curve.
8. To study the Curies temperature of materials using Dielectric set up.
9. To verify the inverse square law with the help of a photovoltaic cell.
10. To determine Planks constant using photocell.
11. To study the characteristics of Solar cell and find out the fill factor.
12. To find temperature co-efficient of platinum using Callender Griffith bridge.
13. To study the forward and reverse characteristics of P-N junction diode.

Course code	EEE-103P				
Category	Engineering Science Course				
Course title	**Basics of Electrical Engineering (P)**				
Scheme and Credits	L	T	P	Credits	
	0	0	2	1	
Class work	50 Marks				
Exam	**50 Marks**				
Total	**100 Marks**				
Duration of Exam	03 Hours				

Note: At least 8 experiments are to be performed by the students.

List of Subject related Experiments:

1. Introduction and use of measuring instruments – voltmeter, ammeter, multi-meter, oscilloscope. (Resistors, Capacitors and Inductors)

2. Verification of Ohm's Law, Kirchhoff current and voltage laws

3. To measure the power in three phase circuits using two wattmeter method.

4. To verify Thevenin's and Norton theorems.

5. To verify Maximum power transfer and Superposition theorems.

6. To perform direct load test of a transformer and plot efficiency Vs load characteristic.

7. To perform O.C. and S.C. tests of a transformer.

8. Measurement of power in a 3-phase system by two wattmeter method.

9. Measurement of power by 3 voltmeter/3 Ammeter method.

10. To verify the resonance in R-L-C circuits.

11. Demonstration of cut-out sections of machines: dc machine (commutator-brush arrangement), induction machine (squirrel cage rotor), synchronous machine (field winging - slip ring arrangement) and single-phase induction machine.

12. Torque Speed Characteristic of shunt dc motor.

Course code	CSE-101P				
Category	Professional Core Course				
Course title	Programming for Problem Solving Using C (P)				
Scheme and Credits	L	T	P	Credits	
	0	0	2	1	
Class work	50 Marks				
Exam	50 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

Note: At least 6 experiments are to be performed by the students.

List of Subject related Experiments:

Laboratory Outcomes

- To formulate the algorithms for simple problems
- To translate given algorithms to a working and correct program
- To be able to correct syntax errors as reported by the compilers
- To be able to identify and correct logical errors encountered at run time
- To be able to write iterative as well as recursive programs
- To be able to represent data in arrays, strings and structures and manipulate them through a program

Tutorial 1: Problem solving using computers:
Lab1: Familiarization with programming environment

Tutorial 2: Variable types and type conversions:
Lab 2: Simple computational problems using arithmetic expressions

Tutorial 3: Branching and logical expressions:
Lab 3: Problems involving if-then-else structures

Tutorial 4: Loops, while and for loops:
Lab 4: Iterative problems e.g., sum of series
Tutorial 5: 1D Arrays
Lab 5: 1D Array manipulation

Tutorial 6: 2D arrays and Strings
Lab 6: Matrix problems, String operations

Tutorial 7: Functions, call by value:
Lab 7: Simple functions

Course code	MEE-102P				
Category	Engineering Science Course				
Course title	Workshop Practices (P)				
Scheme and Credits	L	T	P	Credits	
	1	0	3	2.5	
Class work	50 Marks				
Exam	50 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

Objectives of the course

1. To impart fundamental Knowledge of engineering practices such as fitting, wood working, foundry, machining, welding, etc. for manufacturing a product.
2. To prepare the students to understand the various tools and equipment's used in these processes and their working principle
3. To impart fundamental Knowledge of Lathe machine
4. To able to understand the basic knowledge of various welding processes

Class Work

Introduction:

Introduction to Manufacturing Processes and their Classification, Introduction to additive manufacturing, Industrial Safety.

Machining Shop

Lathe, description of lathe: headstock, tailstock, gearbox, carriage, apron, cutting speed, feed & depth of cut, cutting tools, Chucks: 3 jaw, 4 jaw.

Fitting shop:

Introduction, classification of metals: ferrous and nonferrous, fitting tools: measuring and marking tools, marking schemes for a fitting jobs, cutting tools.

Carpentry shop:

Introduction of carpentry, types of woods, carpentry tolls: measuring tools, marking tolls, cutting tools: saws, chisels, planning tools, drilling tools, striking tools, drilling tools, wood working joints, wood working lathe.

Foundry Shop

Introduction, foundry hand tools, measuring boxes, ladle, moulding, furnaces,Pattern: Types of Pattern and Allowances

Welding Shop

Introduction to welding, Classification of Welding Processes,Arc welding & Gas welding equipment's.

Reference Books:

1. S K Hajra Choudhury, Nirjhar Roy, A K Hajra Choudhury, Elements of workshop Technology (vol. 1&2), Media Promoters.
2. B S Raghuwanshi, A Course in Workshop Technology (manufacturing Process vol. 1& 2) Dhanpat Rai & CO.
3. O.P. Khanna, Workshop Technology. Dhanpat Rai Publication.
4. W A J Chapman, Workshop technology in SI unit (part – 1 &2), Mc Graw Hill Education.
5. M.P. GROOVER, Principles of Modern Manufacturing, Wiley.
6. Kalpakjian, Manufacturing Process for Engineering Materials, Pearson Education India.

Lab Work

List of Experiments

1. To study different types of measuring tools used in metrology and determine least counts of vernier callipers, micrometres and vernier height gauges.

2. To study different types of machine tools (lathe, shaper, planer, milling, drilling machines)

3. To prepare a job on a lathe involving like facing, outside turning, taper turning, step turning, radius making and parting-off.

4. To study different types of fitting tools and marking tools used in fitting practice.

5. To prepare a job made out of MS Flats, making saw – cut filling V-cut taper at the corners.

6. To prepare lay out on a metal sheet by making and prepare rectangular tray pipe shaped components e.g. funnel.

7. To prepare joints for welding suitable for butt welding and lap welding.

8. To study various types of carpentry tools and prepare simple types of at least two wooden joints.

9. To prepare simple engineering components/shapes by forging.

10. To prepare mold and core assembly.

11. To prepare horizontal surface/vertical surface/curved surface/slats or V-grooves on a shaper/planner.

12. To prepare a job involving side and face milling on a milling

13. To prepare a job on CNC Machine/Additive Manufacturing.

Note : At least eight experiments/jobs are to be performed/prepared by the students in the semester.

Gurugram University Scheme of Studies and Examination

Bachelor of Technology (SCHEME A2) Semester-2

Sr. No.	Course Code	Course Title	Hours per week			Total Contact Hrs. per week	Credit
			L	T	P		
1.	BSM-104	Mathematics-II	3	1	0	4	4
2.	HSV-102	Human Value & Soft Skills	2	0	2	4	3
3.	EEE-103 OR BSP-103	Basics of Electrical Engineering OR Physics	3 3	0 1	0 0	3 OR 4	3 OR 4
4.	CSE-102	Data Structure Using C	3	0	0	3	3
5.	CSE-106	Python Programming	3	0	0	3	3
6.	ECE-102	Electronics Engineering-I	3	0	0	3	3
7.	EEE-103P OR BSP-103P	Basics of Electrical Engineering (P) OR Physics (P)	0	0	2	2	1
8.	CSE-102P	Data Structure Using C (P)	0	0	2	2	1
9.	CSE-106P	Python Programming (P)	0	0	2	2	1
10.	ECE-102P	Electronics Engineering-I (P)	0	0	2	2	1
Total						**28 / 29**	**23/24**

Course code	BSM-104				
Category	Basic Science Course				
Course title	Mathematics-II				
Scheme and Credits	L	T	P	Credits	
	3	1	0	4	
Class work	30 Marks				
Exam	70 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

Objectives of the course

4. Demonstrate their understanding of mathematical ideas from multiple perspectives.
5. To develop logical understanding of the subject
6. To develop mathematical skill so that students are able to apply mathematical methods & principals in solving problem from Engineering fields.
7. To make aware students about the importance and symbiosis between Mathematics and Engineering.

Unit-I

Ordinary Differential Equations: Exact differential equations, Equations reducible to exact differential equations, Applications of differential equations of first order & first degree to simple electric circuits, Newton's law of cooling, Heat flow and Orthogonal trajectories, Linear Differential equations of second and higher order, Complete solution, Complementary function and Particular integral, Method of variation of parameters to find particular integral, Cauchy's and Legendre's linear equations.

Unit-II

Laplace Transforms and its Applications: Laplace transforms of elementary functions, Properties of Laplace transforms, Existence conditions, Transforms of derivatives, Transforms of integrals, Multiplication by tn , Division by t, Evaluation of integrals by Laplace transforms, Laplace transform of unit step function, Unit impulse function and Periodic function, Inverse transforms.

Unit-III

Partial Differential Equations: Formation of partial differential equations, Lagrange' linear partial differential equation, First order non-linear partial differential equation, Charpit's method, Method of separation of variables

Unit-IV

Basic Statistics: Measures of Central tendency: Mean, Median, Mode, Measures of Dispersion, Moments, Skewness and Kurtosis, Moments, Variance of a sum, Correlation coefficient, Correlation and regression – Rank correlation; Curve fitting by the method of least squares-fitting of straight lines, second degree parabolas and more general curves.

Reference Books:

1) G.B. Thomas and R.L. Finney, Calculus and Analytic geometry, Pearson Education.
2) Erwin kreyszig, Advanced Engineering Mathematics, John Wiley & Sons.
3) Ramana B.V., Higher Engineering Mathematics, Tata McGraw-Hill Publishing Company Limited.
4) B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers.
5) N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications.
6) P. Sivaramakrishna Das and C. Vijyakumari, Engineering Mathematics, Pearson Education.
7) W. E. Boyce and R. C. DiPrima, Elementary Differential Equations and Boundary Value Problems, Wiley India.
8) S. L. Ross, Differential Equations, Wiley India.
9) R. K, Jain and S. R. K. Iyengar, Advanced Engineering Mathematics, Narosa Publication House Private Limited

Course code	HSV-102				
Category	Humanities and Social Sciences				
Course title	Human Values and Soft Skills				
Scheme and Credits	L	T	P	Credits	
	2	0	2	3	
Class work/Practical	30 Marks				
Exam	70 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

Objectives of the course

a. The course aims at developing the desired English language skills of students of Engineering and Technology so that they become proficient in communication to excel in their professional lives. The course has been designed as to enhance their linguistic and communicative competence.
b. Understanding (Clarity) of Human Relationships and Family.
c. Exposure to Issues in Society and nature (larger manmade systems and Nature).

Unit: 1

Motivation and Objectives of Human Values Course, Purpose of Education, Complimentarily of skills and values, how the current education system falls short, Peers Pressure, Social Pressure In various dimensions of life, Concept of Competition and Time Management.

Unit: 2

Concept of Preconditioning, Concept of Natural Acceptance in Human Being, Understanding Relationships, Dealing with anger, Nine universal values in human relationships. Concept of prosperity, idea of Society, Idea of decentralization of politics, economics, education, justice etc., Its comparison with centralized systems, Balance in nature.

Unit: 3

Techniques of Good Writing , Writing self assessment tasks, Precis writing and note making. Paragraph and Essay writing, Article writing and summarizing

Unit: 4

Business Communication: Formal and Informal Letter writing, Statement of Purpose, Job application & CV (summary statement of academic & professional profiles) and Power point presentations through relevant slides.

English Lab Activity: Blog Writing/Creating a Newsletter, Script writing & enacting for a street play. Develop negotiating skills by using appropriate language of courtesy, Recording individual efforts and holding paired interactions and Group Discussions, Preparing and practising for Interviews.

Suggested reference books

Recommended Readings:

1. Bhatnagar, Nitin andMamtaBhatnagar.Communicative English for Engineers and Professionals.Pearson Education, 2013.
2. Swan, Michael.Practical English Usage. OUP, 1995.
3. Gangal, J.K. Practical Course in Spoken English. New Delhi: PHI Learning, 2015.
4. Konar,Nira. Communication Skills for Professionals. New Delhi: PHI Learning Pvt. Ltd., 2009.
5. Bansal, R.K. and J.B. Harrison. Spoken English. Orient Longman, 1983.
6. Sharma, Sangeeta and Binod Mishra. Communication Skills for Engineers and Scientists. Delhi: PHI Learning Pvt. Ltd., 20
7. Annie Leonard, `` The Story of Stuff,'' Free Press
8. Mohandas Karamchand Gandhi,`` The Story of My Experiments with Truth," Beacon Press
9. J Krishnamurthy,`` On Education," Official repository
10. Hermann Hesse ,`` Siddhartha," Bantam Books
11. ThichNhatHanh,`` Old Path White Clouds," Parallex Press
12. On Education - The Mother Aurobindo Ashram Publication

Course code	EEE-103				
Category	**Engineering Science Course**				
Course title	**Basics of Electrical Engineering**				
Scheme and Credits	L	T	P	Credits	
	3	**0**	**0**	3	
Class work	**30 Marks**				
Exam	**70 Marks**				
Total	**100 Marks**				
Duration of Exam	**03 Hours**				

Objectives of the course

To explain the laws used in the analysis of DC and AC circuits.
To explain the behavior of circuit elements in single-phase circuits.
To explain the construction and operation of transformers, DC generators and motors, Induction motors, and synchronous generators.

Unit: 1.
DC Circuits:
Concept of electrical fields, charge, current, voltage, energy and their inter relationships. Electrical networks elements (R, L and C), voltage and current sources (ideal & controlled), series and parallel circuits.

Classification of electrical networks, Ohm's law, Kirchhoff's law and their applications for network solutions (Nodal and Mesh Analysis), Source transformation, star delta conversion. Network theorems: Superposition theorem, Thevenin and Norton Theorems, Millman Theorem, maximum power transfer theorem, Substitution and Reciprocity theorems.

Unit: 2

Electrostatics: Electrostatics field, electric flux density, electric field strength, absolute permittivity, relative permittivity, capacitance and capacitor, composite dielectric capacitors, capacitors in series and parallel, energy stored in capacitors, charging and discharging of capacitors and time constant.

AC Fundamentals: Sinusoidal voltages and currents, their mathematical and graphical representation, concept of instantaneous, peak (maximum), average and R.M.S. values, frequency,
cycle, period, peak factor and form factor, phase difference, lagging, leading and in phase quantities and phasor representation. Rectangular and polar representation of phasors.

Unit: 3
AC Circuits: Study of Single phase series and parallel R-L, R-C, R-L-C circuits, concept of impedance and admittance for different combinations, wave form and relevant voltage current phasor diagrams.

Concept of active power, reactive power, apparent power, complex power, power factor and resonance in series and parallel RLC circuit. Q- factor and bandwith. Introduction to three- phase circuits.

Single phase transformers: Construction, principle of working, E.M.F. equation, voltage and current ratios. Losses, definition of regulation and efficiency, determination of these by direct loading method. autotransformers and dimmer stats

Unit: 4

Electrical Machines: Introduction, Generation of rotating magnetic fields. Construction and working of separately excited DC motor, Single-phase induction motor, Three-phase induction motor and Synchronous generators.

Safety measures: Electric Shock, Earthing and its types, Safety Precautions to avoid shock, and Working principle of Fuse and Miniature circuit breaker (MCB), Residual Current Circuit Breaker (RCCB).

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Suggested books:

2. E. Huges, "Electrical Technology", ELBS.

Suggested reference books

4. D. P. Kothari and I. J. Nagrath, "Basic Electrical Engineering", Tata McGraw Hill, 2010.
5. V. Del Toro, "Principles of Electrical engineering", PHI.
6. Basic Electrical Engineering, A.E. Fitzgerald , David Higginbotham 2009 , Arvin Grabel, Tata McGraw-Hill Publishing Company; 5th Edition.

Course code	BSP-103				
Category	**Basic Science Course**				
Course title	**Physics**				
Scheme and Credits	**L**	**T**	**P**	**Credits**	
	3	**1**	**0**	**4**	
Class work	**30 Marks**				
Exam	**70 Marks**				
Total	**100 Marks**				
Duration of Exam	**03 Hours**				

Objectives of the course

4. To impart knowledge of basic concepts in applied physics
5. To enhance the analytical capability of the engineering students.
6. To givea balance account of the fundamentals of Physics as well as some of recent developments in this area best suited to the Engineering applications in different branches and to provide the knowledge and methodology necessary for solving problems in the field of engineering.

UNIT – I

Electrostatics in vacuum and linear dielectric medium

Calculation of electric field and electrostatic potential for a charge distribution; Divergence and curl of electrostatic field; Laplace's and Poisson's equations for electrostatic potential Boundary conditions of electric field and electrostatic potential; energy of a charge distribution and its expression in terms of electric field. Electrostatic field and potential of a dipole. Bound charges due to electric polarization; Electric displacement; boundary conditions on displacement.

UNIT – II

Electromagnetism and Magnetic Properties of Materials

Laws of electrostatics, electric current and the continuity equation, laws of magnetism. Ampere's Faraday's laws. Maxwell's equations. Polarisation, permeability and dielectric constant, polar and non-polar dielectrics, applications of dielectric Magnetisation, permeability and susceptibility, classification of magnetic materials, ferromagnetism, magnetic domains and hysteresis, applications.

UNIT – III

Wave Optics and Lasers

Wave Optics: Huygens' principle, superposition of waves and interference of light by wave-front splitting and amplitude splitting; Young's double slit experiment, Newton's rings, Michelson interferometer. Fraunhofer diffraction from a single slit and a circular aperture, the Rayleigh criterion for limit of resolution and its application to vision; Diffraction gratings and their resolving power.

Lasers: Einstein's theory of matter radiation interaction and A and B coefficients; amplification of light by population inversion, different types of lasers: gas lasers (He-Ne, CO), solid-state lasers (ruby, Neodymium), dye lasers; Properties of laser beams: mono-chromaticity.

UNIT – IV

Introduction to Solids and Semiconductors

Free electron theory of metals, Fermi level, density of statesin1, 2 and 3 dimensions, Bloch's theorem for particles in a periodic potential, Kronig-Penney model and origin of energy bands. Types of electronic materials: metals, semiconductors, and insulators. Intrinsic and extrinsic semiconductors, Dependence of Fermi level on carrier-concentration and temperature (equilibrium carrier statistics), Carrier generation and recombination, Carrier transport: diffusion and drift, p -n junction.

Suggested reference books

12. E. Hecht, "Optics", Pearson Education
13. D. J. Griffiths, "Quantum mechanics", Pearson Education
14. B.G. Streetman, "Solid State Electronic Devices", Pearson Education
15. G. Main, "Vibrations and waves in physics", Cambridge University Press
16. H. J. Pain, "The physics of vibrations and waves", Wiley
17. A. Ghatak, "Optics", McGraw Hill Education,
18. O. Svelto, "Principles of Lasers", Springer Science & Business Media,
19. R. Robinett, "Quantum Mechanics", OUP Oxford
20. D. McQuarrie, "Quantum Chemistry", University Science Books
21. D. A. Neamen, "Semiconductor Physics and Devices", Times Mirror High Education Group, Chicago
22. E.S. Yang, "Microelectronic Devices", McGraw Hill, Singapore

Course code	CSE-102				
Category	Professional Core Course				
Course title	Data Structures Using C				
Scheme and Credits	L	T	P	Credits	
	3	0	0	3	
Class work	30 Marks				
Exam	70 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

Unit: 1

Introduction

Fundamentals of pointers in C, pointer declaration, passing pointer to functions, pointers and arrays, dynamic memory allocation, Definition of Algorithm, Data Abstraction, Performance Analysis & Measurement, Files and related operations inC. Data Structures vs Data Types.

Searching and SortingTechniques

Searching techniques: Linear and Binary, Sorting techniques: Selection, Bubble, Insertion, Merge sort, Quicksort, List and Table Sorting.

Unit: 2

Linear Data Structures- I

Arrays: Definition of array, Array storage, sparse arrays; Transpose, addition, and multiplication of sparse matrices, Stacks and Queues and their applications, expression evaluation, A mazing problem; multiple stacks and queues in an array, Application of stacks recursion polish expression and their compilation conversion of infix expression to prefix and postfix expression, Tower of Hanoi problem.

Unit: 3

Linear Data Structures- II

Linked Lists; definition, allocation for stacks and queues. Examples of linked lists, polynomial addition, comparison of sequential and linked allocation of storage; inversion, concatenation & copying of the lists. Implementations in C language.

Doubly Linked List: Definition of circular and doubly linked list, header node, insertion and deletion, sparse matrix, representation using doubly linked lists. Examples for application of doubly linked lists; dynamic storage management; node structures,

routines for allocation and deallocation, generalized lists and recursive algorithms for copying and comparison oflists.

Unit: 4

Non Linear Data Structures

Trees, Basic concepts and definitions of a tree and binary tree and associated terminology, Binary tree traversal techniques, Binary tree representation of trees, transformation of trees into binary trees, some more operations on binary trees, Binary Search Trees, Heaps and heapsort, threaded binary trees, Graphs: Representation of graphs and their traversal, Minimum cost Spanning Trees.

BOOKS:

1.Seymour Lipschutz:Data Structures with C, Schaum's outline by TMH

1. E Horowitz and S. Sahni: Fundamentals of Data Structures in C, Second Edition, UniversitiesPress, Hyderabad.
2. R.B. Patel: Expert Data Structures in C, Khanna Publishers,2001.
3. R.L. Kruse: Data Structures & Program Design in C, PHI.
4. D.F. Knuth: The art of Computer Programming Vol 1, Narosa Publications,1985.
5. Byron S. Gottfried & J K Chhabra: Theory and Problems of Programming with C Language, SchaumSeries, TMH,2005.

Course code	CSE-106				
Category	Professional Core Course				
Course title	Python Programming				
Scheme and Credits	L	T	P	Credits	
	3	0	0	3	
Class work	30 Marks				
Exam	70 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

Unit: 1

Introduction: Installing Python; basic syntax, interactive shell, editing, saving, and running a script; data types; variables, assignments; numerical types; arithmetic operators and expressions; Loops and selection statements, Control statements String manipulations: subscript operator, indexing, slicing a string; text files: reading/writing text and numbers from/to a file; creating and reading a formatted file

Unit: 2

Lists, dictionary and Design with functions: Basic list operators, replacing, inserting, removing an element; searching and sorting lists; dictionary literals, adding, and removing keys, accessing and replacing values; traversing dictionaries. Hiding redundancy, complexity; arguments and return values; Program structure and design. Recursive functions.

Unit: 3

Object Oriented concepts: Design with Classes persistence storage of objects, inheritance, polymorphism, operator overloading, exception handling, module, packages. Graphical User Interfaces: Terminal based and GUI based programs, Simple GUI-Based Programs, Windows and Window Components, Input and Output with Entry Fields, Defining and Using Instance Variables, Other Useful GUI Resources

Unit: 4

Advance concepts: Simple graphics and image processing, Turtle operations, Manipulating turtle screen, Drawing two dimensional shapes, examining an object attributes, Taking a random walk, Image processing: Image manipulation operations, properties of images.

Basics of panda and numpy, use of anaconda, How to create dashboard and overview of Django

Suggested books:

Allen B. Downey, “Think Python: How to Think like a Computer Scientist”, 2nd Edition, O’Reilly Publishers, 2016.

Karl Beecher, “Computational Thinking: A Beginner's Guide to Problem Solving and programming”, 1st Edition, BCS Learning & Development Limited, 2017.

Suggested reference books

1. Fundamentals of Python: First Programs, Kenneth Lambert, Course Technology, Cengage Learning, 2012.
2. Introduction to Computer Science Using Python: A Computational Problem-Solving Focus, By Charles Dierbach, John Wiley & Sons, December 2012

Course code	ECE-102				
Category	**Engineering Science Course**				
Course title	**Electronics Engineering -I**				
Scheme and Credits	L	T	P	Credits	
	3	**0**	**0**	3	
Class work	**30 Marks**				
Exam	**70 Marks**				
Total	**100 Marks**				
Duration of Exam	**03 Hours**				

Objectives of the course

To familiarize students to the electronics devices.

To introduce p-n junction theory, operation of the semiconductor devices and their use in basic electronic circuits.

To introduce BJT & FET, operation of the semiconductor devices and their use in basic electronic circuits.

Unit: 1

Conducting materials: Review of energy bands, description of materials, drift velocity, collision time, Mean free path, mobility, conductivity, relaxation time, factors affecting conductivity of materials, types of thermal conductivity, Wiedmann-Franz law, super conductivity, effect of magnetic field, conducting materials, applications.

Semiconductor characteristics: Review of Si and Ge as semiconducting materials, Continuity Equation, P-N junction, Drift & Diffusion, Diffusion & Transition capacitances of P-N junction. Introduction to p-n junction diode and its applications.

Unit: 2

P-N junction diode and its applications: Introduction to p-n junction diode and its applications. Half wave & full wave rectifiers. clipping circuits, clamping circuits, filter circuits, peak to peak detector and voltage multiplier circuits.

Some Special Devices: Zener diode, Photodiodes, photo detectors, solar cell, light emitting diodes, semiconductor lasers, and light emitting materials.

Unit: 3

Bipolar junction transistors: Fundamentals of BJT, BJT biasing :base bias, emitter feedback bias, collector feedback bias, voltage divider bias and its operation , BJT voltages and currents characteristics: CE, CB and CC, and DC & AC load line and bias point. Thermal stability, BJT as a switching circuits, transistor power dissipation.

Construction and working of SCR (semiconductor controlled rectifier), DIAC, TRIAC, IGBT,

Unit: 4

Field Effect Devices: JFET: basic Operation and characteristics, drain and transfer characteristics, pinch off voltage, parameters of JFET: Transconductance (gm), ac drain resistance (rd), amplification factor(μ) ,Small Signal Model & Frequency Limitations. MOSFET: basic operation, depletion and enhancement type, pinch-off voltage, Shockley equation and Small Signal Model of MOSFET, MOS capacitor. UJT: Introduction and its applications.
Brief introduction to Planar Technology for device fabrication.

Suggested books:

3. J. Millman and C. Halkias, Integrated Electronics, McGraw Hill, 2nd Edition, 2009.
4. A. Sedra and C. Smith, Microelectronic Circuits: Theory and Applications, Oxford University Press, 6th Edition, 2013

Suggested reference books

7. Boylestad and Nashelsky, “Electronic Devices and Circuit Theory” Pearson publishers, 10th Edition
8. Tyagi M.S., “Introduction to Semiconductor Materials and Devices”, John Wiley & Sons, 1993.
9. Spencer and Ghausi, Introduction to Electronic Circuit Design, Pearson Education, 2003
10. A. Dutta, Semiconductor Devices and Circuits, Oxford University Press, ND 2008

Course code	EEE-103P				
Category	Engineering Science Course				
Course title	**Basics of Electrical Engineering (P)**				
Scheme and Credits	L	T	P	Credits	
	0	0	2	1	
Class work	50 Marks				
Exam	**50 Marks**				
Total	**100 Marks**				
Duration of Exam	03 Hours				

Note: At least 8 experiments are to be performed by the students.

List of Subject related Experiments:

1. Introduction and use of measuring instruments – voltmeter, ammeter, multi-meter, oscilloscope. (Resistors, Capacitors and Inductors)

2. Verification of Ohm's Law, Kirchhoff current and voltage laws

3. To measure the power in three phase circuits using two wattmeter method.

4. To verify Thevenin's and Norton theorems.

5. To verify Maximum power transfer and Superposition theorems.

6. To perform direct load test of a transformer and plot efficiency Vs load characteristic.

7. To perform O.C. and S.C. tests of a transformer.

8. Measurement of power in a 3-phase system by two wattmeter method.

9. Measurement of power by 3 voltmeter/3 Ammeter method.

10. To verify the resonance in R-L-C circuits.

11. Demonstration of cut-out sections of machines: dc machine (commutator-brush arrangement), induction machine (squirrel cage rotor), synchronous machine (field winging - slip ring arrangement) and single-phase induction machine.

12. Torque Speed Characteristic of shunt dc motor.

PHYSICS Lab

Course code	BSP-103P				
Category	**Basic Science Course**				
Course title	**Physics (P)**				
Scheme and Credits	**L**	**T**	**P**	**Credits**	
	0	**0**	**2**	**1**	
Class work	**50 Marks**				
Exam	**50 Marks**				
Total	**100 Marks**				
Duration of Exam	**03 Hours**				

Note: At least 8 experiments are to be performed by the students.

List of Subject related Experiments:

1. To find out wavelength of monochromatic light using Newton's ring experiment.
2. To find out wavelength of monochromatic light using Diffraction grating.
3. To find out wavelength of monochromatic light using Freshnel's bi-prism
4. To study interference phenomena using Michelson's Interferometer and to find out wavelength of monochromatic light.
5. To study Hall effect in semiconductors and measure the Hall coefficient.
6. To find frequency of AC mains using sonometer.
7. To study the magnetic properties of materials using B-H curve.
8. To study the Curies temperature of materials using Dielectric set up.
9. To verify the inverse square law with the help of a photovoltaic cell.
10. To determine Planks constant using photocell.
11. To study the characteristics of Solar cell and find out the fill factor.
12. To find temperature co-efficient of platinum using Callender Griffith bridge.
13. To study the forward and reverse characteristics of P-N junction diode.

Course code	CSE-102P				
Category	Professional Core Course				
Course title	Data Structures Using C (P)				
Scheme and Credits	L	T	P	Credits	
	0	0	2	1	
Class work	50 Marks				
Exam	50 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

Note: At least 8 experiments are to be performed by the students.

List of Subject related Experiments:

1. Write a program to search an element in a two-dimensional array using linear search.
2. Using iteration & recursion concepts write programs for finding the element in the array using Binary Search Method
3. Write a program to perform following operations on tables using functions only
(a) Addition (b) Subtraction (c) Multiplication (d) Transpose
4. Using iteration & recursion concepts write the programs for Quick Sort Technique
5. Write a program to implement the various operations on string such as length of string concatenation, reverse of a string & copy of a string to another.
6. Write a program for swapping of two numbers using 'call by value' and 'call by reference strategies.
7. Write a program to implement binary search tree.
8. (Insertion and Deletion in Binary search Tree)
9. Write a program to create a linked list & perform operations such as insert, delete, update, reverse in the link list
10. Write the program for implementation of a file and performing operations such as insert, delete, update a record in the file.
11. Create a linked list and perform the following operations on it
(a) add a node (b) Delete a node

Course code	CSE-106P				
Category	Professional Core Course				
Course title	Python Programming (P)				
Scheme and Credits	L	T	P	Credits	
	0	0	2	1	
Class work	50 Marks				
Exam	50 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

Note: At least 8 experiments are to be performed by the students.

List of Subject related Experiments:

1. Compute the GCD of two numbers.
2. Find the square root of a number (Newton‘s method)
3. Exponentiation (power of a number)
4. Find the maximum of a list of numbers
5. Linear search and Binary search
6. Selection sort, Insertion sort
7. Merge sort
8. First n prime numbers
9. Multiply matrices
10. Programs that take command line arguments (word count)
11. Find the most frequent words in a text read from a file
12. Simulate elliptical orbits in Pygame
13. Simulate bouncing ball using Pygame

Course Code	ECE-102P				
Category	Professional Core Course				
Course title	Electronics Engineering -I (P)				
Scheme and Credits	L	T	P	Credits	
	0	0	2	1	
Class work	50 Marks				
Exam	50 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

Note: At least 8 experiments are to be performed by the students.

Objective: To attain expertise in lab equipment handling and understanding the basic devices, their properties, characteristics in detail. Along with their practical usage in the circuit

1. Study of lab equipments and components: CRO, Multimeter, Function Generator, Power supply- Active, Passive Components & Bread Board.

2. Study of V-I Characteristics of Si and Ge Diodes

3. Study of Zener Diode Characteristics and Zener Diode as Voltage Regulator

4. Study of Half Wave and Full Wave Rectifiers

5. Study of Rectifiers with Filters

6. Study of BJT Characteristics

7. Study of FET Characteristics

8. Study of BJT Biasing

9. To plot V-I Characteristics of DIAC.

10. To draw V-I characteristics of TRIAC for different values of Gate Currents.

11. Study of Characteristic of silicon-controlled rectifier.

Gurugram University
Scheme of Studies and Examination
Bachelor of Technology (SCHEME A3) Semester-1

Sr. No.	Course Code	Course Title	Hours per week			Total Contact Hrs. per week	Credit
			L	T	P		
1.	HSE-101	Communication Skills in English	2	0	0	2	2
2.	BSM-103	Mathematics-I	3	1	0	4	4
3.	BSC-101 OR EEE-101	Chemistry OR Basic of Electrical and Electronics Engineering	3 3	0 0	0 0	3	3
4.	CSE-101	Programing for problem solving using C	3	0	0	3	3
5.	ENV-101	Basics of Environmental Science	2	0	0	2	2
6.	HSE-101P	Communication Skills in English (P).	0	0	2	2	1
7.	BSC-101P OR EEE-101P	Chemistry (P) OR Basics of Electrical and Electronics Engineering (P)	0	0	2	2	1
8.	CSE-101P	Programing for Problem solving using C (P)	0	0	2	2	1
9.	MEE-104P OR MEE-102P	Engineering Drawing OR Workshop Practices (P)	1 1	0 0	3 3	4	2.5
10.	AUS-101	Sports (Audit Course) Compulsory	0	0	2	2*	0
Total						**24+2***	**19.5**

Course code	HSE-101				
Category	Humanities and Social Sciences				
Course title	Communication Skills in English				
Scheme and Credits	L	T	P	Credits	
	2	0	0	2	
Class work/ Practical	30 Marks				
Exam	70 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

Objectives of the course:

- **a.** The course will focus on the four integral skills of language, improving the proficiency levels in all of them and to learn to use language as a tool for effective communication.
- **b.** This course will widen the understanding of the learners in all genres of literature (short stories, poetry, autobiographies.) with the help of expository pieces .
- **c.** The course will strive to equip the learner with the ability to express oneself and be understood by others with clarity and precision, in both written and spoken forms.
- **d.** This course will encourage creative use of language through translation, paraphrasing and paragraph writing.
- **e.** Along with the above, the course will also build confidence and encourage the students to use a standard spoken form of English in order to prepare them to face job interviews, workplace and in higher studies.

Unit:1

Remedial English : Parts of speech, Gerunds, Participles and infinitives; Clauses; Sentence constructions (unity; avoidance of choppy and rambling sentences, logic and consistency, conciseness, sequencing of ideas); Sentence errors-agreement between verb and subject, pronoun and antecedents, sequence of tenses, problems involving modifiers (dangling and misplaced modifiers); Shifts in point of view consistency of number and person, tense, mood, voice and subject; Parallelism; Omissions and mixed constructions.

Unit: 2

Vocabulary : Methods of building vocabulary-etmological roots, prefixes and suffixes; Commonly used foreign words and phrases; spelling; words often confused synonyms and homonyms; one word substitutes; verbal idioms.

Unit: 3

Punctuation and Mechanics: End Punctuation; internal Punctuation; Word Punctuation. Comprehension: Abstracting; Summarizing; Observation, Findings and Conclusions; Illustration and Inductive Logic; Deduction and Analogy.

Unit: 4

Presentation: Oral presentation- Extempore, discussion on topics of contemporary relevance, Interviews.

Written Comprehension: The ability to write after listening to and reading select speeches, news bulletins, presentations and answering questions based on what has been heard. Reading the given texts to skim, scan, infer and answer comprehension questions. Reading texts like case studies and project reports for critical assessment and book Review.

Suggested Books:

1. Nitin Bhatnagar and Mamta Bhatnagar, Communicative English for Engineers and Professionals. Pearson Education.
2.Bhatnagar, k. Manmohan.Ed. The Spectrum of Life: An Anthology of Modern Prose. Delhi: Macmillan India Ltd., 2006.
3 C. Murlikrishna& Sunita Mishra, Communication Skills for Engineers, Pearson Ed.
4 Sinha, R.P.Current English Grammar and Usage. OUP.
5.Rizvi, M. Ashraf.Effective Technical Communication. McGraw Hill Education (India) Pvt. Ltd., 2014.
6.Eastwood, John.Oxford Guide to English Grammar.OUP, 2010.
7.Kumar, Sanjay and PushpLata. Communication Skills. OUP, 2011.
8. Raman, Meenakshi and Sangeeta Sharma.CommunicationSkills.NewDelhi:OUP,2011.
9.Hill, L.A.A Guide to Correct English.London:OUP,1965.
10.Oxford Dictionary of English Idioms. New Delhi: OUP, 2009
11*http://yousigma.com/religionandphilosophy/swamivivekananda/thescecretofwork.pdf

Course code	BSM-103				
Category	Basic Science Course				
Course title	Mathematics-I				
Scheme and Credits	L	T	P	Credits	
	3	1	0	4	
Class work	30 Marks				
Exam	70 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

Objectives of the course

1. To develop logical understanding of the subject
2. To develop mathematical skill so that students are able to apply mathematical methods & principals in solving problem from Engineering fields.
3. To make aware students about the importance and symbiosis between Mathematics and Engineering.

Unit-I

Matrices & Its Application:

Elementary Matrices, Elementary Transformations, Inverse using elementary transformations, Rank of a matrix, Normal form of a matrix, Linear dependence and independence of vectors, Consistency of linear system of equations, Linear and Orthogonal Transformations, Eigenvalues and Eigenvectors, Properties of eigenvalues, Cayley-Hamilton Theorem, Diagonalization of Matrices.

Unit-II

Sequences and Series:

Convergence of sequence and series, Tests for convergence, Power series: Taylor's series, series for exponential, trigonometric and logarithm functions, Fourier series: Half range sine and cosine series, Parseval's theorem.

Unit-III

Differential Calculus: Limit, Continuity and Differentiability of function of single variable, Successive Differentiation, Leibnitz Theorem, Taylor's and Maclaurin's Series for Single Variable function, Partial derivatives, Homogeneous functions, Euler's Theorem, Jacobian, Maxima-Minima of function of two variables, Lagrange's Method of undetermined multipliers.

Unit-IV

Integral Calculus: Basic concepts of integration and properties of definite integrals, Applications of single integration to find volume of solids and surface area of solids of revolution, Double integral, Change of order of integration, Double integral in Polar Co-ordinates, Applications of double integral to find area enclosed by plane curves, Triple integral, Beta and Gamma functions.

Reference Books:

1. G.B. Thomas and R.L. Finney, Calculus and Analytic geometry, Pearson Education.

2. Erwin Kreyszig, Advanced Engineering Mathematics, John Wiley & Sons.

3. D. Poole, Linear Algebra: A Modern Introduction, Brooks Cole.

4. Ramana B.V., Higher Engineering Mathematics, Tata McGraw-Hill Publishing Company Limited.

5. N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications.

6. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers.

7. V. Krishnamurthy, V.P. Mainra and J. L. Arora, An introduction to Linear Algebra, Affiliated East– West Press Private limited

Course code	BSC-101				
Category	BASIC SCIENCE COURSES				
Course title	Chemistry				
Scheme and Credits	L	T	P	Credits	
	3	0	0	3	
Class work	30Marks				
Theory Exam	70 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

Course Objective:

1. To analyse microscopic chemistry
2. Understand the concept of hardness of water and phenomenon of corrosion
3. Rationalise periodic properties
4. Distinguish the ranges of the electromagnetic spectrum

UNIT-I

Atomic and molecular structure: Schrodinger equation (Introduction and concept only). Forms of the hydrogen atom wave functions and the plots of these functions to explore their spatial variations (derivation excluded). Molecular orbital energy level diagrams of diatomic molecules. Pi-molecular orbitals of butadiene and benzene. Crystal field theory and the energy level diagrams for transition metal ions.

UNIT-III

Periodic properties: Effective nuclear charge, penetration of orbitals, variations of s, p, d and f orbital energies of atoms in the periodic table, electronic configurations, atomic and ionic sizes,ionization energies, electron affinity and electronegativity, polarizability, oxidation states.

UNIT-III

Stereochemistry: Representations of 3 dimensional structures, structural isomers and stereoisomers, configurations, symmetry and chirality, enantiomers, diastereomers, optical activity, absolute configurations and conformational analysis.

Organic reactions: Introduction to reactions involving substitution, addition, elimination, oxidation, reduction, cyclization (mechanism excluded).

UNIT-IV

Intermolecular forces: Ionic, dipolar and Van der Waals interactions.

Water Chemistry: Hardness of water- Introduction, Types, Measurement of hardness by EDTA method, Methods of water softening (Lime soda process, Zeolite Process, Demineralisation process).

Suggested Text Books:

(i) University Chemistry, Bruce M. Mahan, Pearson Education.
(ii) Chemistry: Principles and Applications, by M. J. Sienko and R. A. Plane
(iii) Essentials of Analytical Chemistry, Shobha Ramakrishnan and Banani Mukhopadhyay, Pearson Education.
(iv)Fundamentals of Molecular Spectroscopy, by C. N. Banwell
(v) Engineering Chemistry (NPTEL Web-book), by B. L. Tembe, Kamaluddin and M. S. Krishnan
(vi) Physical Chemistry, by P. W. Atkins
(vii) Organic Chemistry: Structure and Function by K. P. C. Volhardt and N. E. Schore, 5th Edition.

Course Outcomes:

The course will enable the student to:

- Analyse microscopic chemistry in terms of atomic and molecular orbitals and intermolecular forces.
- Understand the concept of hardness of water and phenomenon of corrosion.
- Distinguish the ranges of the electromagnetic spectrum used for exciting different molecular energy levels in various spectroscopic techniques.
- Rationalise periodic properties such as ionization potential, electronegativity, oxidation states and electron affinity.

Course code	EEE-101				
Category	**Engineering Science Course**				
Course title	**Basics of Electrical and Electronics Engineering**				
Scheme and Credits	L	T	P	Credits	
	3	**0**	**0**	3	
Class work	**30 Marks**				
Exam	**70 Marks**				
Total	**100 Marks**				
Duration of Exam	**03 Hours**				

Objectives of the course

To provide basic knowledge of different elements of electrical and electronics engineering field.
To familiarize the students with the concepts of electrical circuits and network Analysis.

To understand the basics of AC and DC circuits.

To familiarize students to the analysis and design of analog electronic circuits which form the basic building blocks of almost any electronic system.

To introduce p-n junction theory, operation of the semiconductor devices and their use in basic electronic circuits.

Unit: 1
DC Circuits

Role and importance of circuits in Engineering, Concept of fields, charge, current, voltage, energy and their interrelationships. Electrical circuit elements (R, L and C), voltage and current sources(ideal & Controlled),series and parallel circuits, Network reduction: voltage and current division Kirchhoff current and voltage laws with their applications (Nodal and Mesh Analysis), Source transformation - star delta conversion. Superposition theorem, Thevenin and Norton Theorems, Millman,Substitution and Reciprocity theorem.

Unit: 2
AC Circuits

Representation of sinusoidal waveforms, average, peak and rms values, complex representation of impedance, phasor representation, complex power, real power, reactive power, apparent power, power factor and Energy, Analysis of single-phase ac circuits consisting of R, L, C, RL, RC, RLC combinations (series and parallel),Resonance; Introduction to three- phase circuits

Unit: 3

Introduction to p-n junction diode and its applications. Half wave & full wave rectifiers. clipping and clamping circuits, Varactor, Varistor, Voltage Regulator

Bipolar junction transistors and its biasing BJT operation, BJT voltages and currents, CE, CB and CC characteristics, DC load line and bias point, base bias, emitter feedback bias, collector feedback bias, voltage divider bias, Thermal stability, biasing BJT switching circuits, transistor power dissipation and switching time, Testing of bipolar junction transistor with multi-meter, Reading datasheet of BJT.

Unit: 4

Field Effect Devices: JFET : basic Operation and characteristics, drain and transfer characteristics, pinch off voltage, parameters of JFET: Transconductance (gm), ac drain resistance (rd), amplification factor(μ) ,Small Signal Model & Frequency Limitations. MOSFET: basic operation, depletion and enhancement type, pinch-off voltage, Shockley equation and Small Signal Model of MOSFET, MOS capacitor.

Suggested books:

1. E. Huges, "Electrical Technology", ELBS.
2. J. Millman and C. Halkias, Integrated Electronics, McGraw Hill, 2nd Edition, 2009.
3. M.M. Mano: Digital Logic Design, Phi.

Suggested reference books

1. D. P. Kothari and I. J. Nagrath, "Basic Electrical Engineering", Tata McGraw Hill, 2010.
2. V. Del Toro, "Principles of Electrical engineering", PHI.
3. A. Sedra and C. Smith, Microelectronic Circuits: Theory and Applications, Oxford University Press, 6th Edition, 2013.
4. Boylestad and Nashelsky, "Electronic Devices and Circuit Theory" Pearson publishers, 10th Edition
5. R.P. Jain: Modern Digital Electronics, Tmh.
6. Malvino and Leach, " Digital Principles and Applications", TMH publishers, 8th Edition
7. Tyagi M.S., "Introduction to Semiconductor Materials and Devices", John Wiley & Sons, 1993.
8. Basic Electrical Engineering, A.E. Fitzgerald , David Higginbotham 2009 , Arvin Grabel, Tata McGraw-Hill Publishing Company; 5th Edition.

Course code	CSE-101				
Category	Professional Core Course				
Course title	Programming for Problem Solving Using C				
Scheme and Credits	L	T	P	Credits	
	3	0	0	3	
Class work	30 Marks				
Exam	70 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

Unit 1

Introduction to Programming: Idea of Algorithm: Steps to solve logical and numerical problems. Representation of Algorithm: Flowchart/Pseudocode with examples. C Programming: Keywords, Variables and Data Types: basic, derived and user defined, Type Conversions, Header Files, Basic Input and Output Functions and Statements, Compilation, Syntax and Logical Errors in compilation, Object and Executable Code, Storage Classes, Arithmetic Expressions and Precedence.

Unit 2

Preprocessors, Conditional and Branching Statements, Loops/ Iterative Statements, Writing and evaluation of conditionals and consequent branching.

Unit 3

Arrays (1-D, 2-D), Character Arrays and Strings, Arrays with Pointers, Functions (including using built in libraries), Parameter passing in functions, Call by Value, Call by Reference, Passing arrays to functions, Recursion, as a different way of solving problems. Example programs, such as Finding Factorial, Fibonacci series, Ackerman function etc.

Unit 4

Idea of pointers, Defining pointers, Use of Pointers in self-referential structures, Introduction to Dynamic Memory Allocation and its Methods, Structures, Union, Defining Structures and Array of Structures, File Handling.

Suggested Text Books:

Ajay Mittal, Programming in C, 'A Practical Approach', Pearson Education.
Byron Gottfried, Schaum's Outline of Programming with C, McGraw-Hill
E. Balaguruswamy, Programming in ANSI C, Tata McGraw-Hill
Yashavant Kanetkar, Let Us C, BPB Publication.

Suggested Reference Books

Brian W. Kernighan and Dennis M. Ritchie, The C Programming Language, Prentice Hall of India.

Course code	ENV-101				
Category	Humanities and Social Sciences				
Course title	Basics of Environmental Science				
Scheme and Credits	L	T	P	Credits	
	2	0	0	2	
Class work/Practical	50Marks				
Exam	50Marks				
Total	100Marks				
Duration of Exam	03 Hours				

Course Objective:
To impart the knowledge and awareness for the environmental protection for real-time contribution during an execution of engineering practices in the society.

Unit 1
Environmental studies and Natural Resources:
Definition, scope and importance of environmental studies.
Natural Resources: Renewable and non-renewable resources, and associated problems
(a) Forest resources: Use and over-exploitation, deforestation, Timber extraction, mining, dams and their effects on forests and tribal people.
(b)Water resources: Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dam's benefits and problems.
(c) Mineral Resources: Use and exploitation, environmental effects of extracting and using mineral resources.
(d)Food Resources: World food problems, changes caused by agriculture and over grazing, effects of modern agriculture, fertilizers-pesticides problems, water logging, salinity.
(e) Energy Resources: Growing energy needs, renewable and non renewable energy sources, use of alternate energy sources.

Unit 2
Eco Systems:
Concept of an eco-system, Structure and function of an eco-system, Producers, consumers, decomposers, Energy flow in the ecosystems, Ecological succession, Food chains, food webs and ecological pyramids.
Introduction, types, characteristic features, structure and function of the following ecosystems:
(a) Forest ecosystem

(b) Grass land ecosystem
(c) Desert ecosystem
(d) Aquatic eco systems (ponds, streams, lakes, rivers, oceans, estuaries)

Unit 3
Environmental Pollution:
Definition, Causes, effects and control measures of;
(a) Air pollution
(b)Soil pollution
(c) Marine pollution
(d)Noise pollution
(e) Nuclear hazards
Disaster management: Floods, earth quake, cyclone and landslides.

Unit 4
Social issues and the Environment:
From unsustainable to sustainable development, Urban problems related to energy, Water conservation, rain water harvesting, watershed management.
Environmental ethics: issues and possible solutions, Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust. Environment protection Act, Air (prevention and control of pollution) Act, Water (prevention and control of pollution) Act, Wildlife protection Act, Forest conservation Act, Issues involved in enforcement of environmental legislations.

Recommended Books:
1. Textbook of Environmental studies, Erach Bharucha, UGC.
2. Fundamental concepts in Environmental Studies, D. D. Mishra, S Chand & Co Ltd.
Course Outcomes :
1.To understand the basic concepts of environmental studies and natural resources.
2. To learn about the various eco-systems of nature.
3. To gain knowledge about different types of environmental pollutions and their control measures.
4. To acquire the knowledge about the various social aspects related to the environment.

Course code	HSE-101P				
Category	Humanities and Social Sciences				
Course title	Communication Skills in English (P)				
Scheme and Credits	L	T	P	Credits	
	0	0	2	1	
Class work/ Practical	50 Marks				
Exam	50 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

Communication Skills in English (P)

Lab Activity: The students will acquire basic proficiency in English with special emphasis on listening, comprehension and speaking skills both at social and professional platforms.

(i) Listening comprehension
(ii) Recognition of phonemes in International Phonetic Alphabet
(iii) Self introduction and introduction of another person
(iv) Conversation and dialogues in common everyday situations
(v) Communication at work place (Standard phrases and sentences in various situations)
(vi) Telephonic communication
(vii) Speeches for special occasions (Welcome speeches, Introduction speeches, Felicitation speeches and Farewell speeches)
(viii) Tag Questions
(ix) Formal Presentations on literary texts prescribed in theory paper, Question Formation & Mock Press Conference

Course code	BSC-101P				
Category	BASIC SCIENCE COURSES				
Course title	Chemistry (P)				
Scheme and Credits	L	T	P	Credits	
	0	0	2	1	
External Practical	50 Marks				
Internal Practical	50 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

Course Objective:
The chemistry laboratory course will consist of experiments illustrating the principles of chemistry relevant to the study of science and engineering.

LIST OF EXPERIMENTS: -
1. Determination of surface tension of given liquid by drop number method.
2. Determine the viscosity of given liquid by using Ostwald's viscometer / Redwood viscometer.
3. Calculate the Rf value of given sample using Thin layer chromatography / Paper chromatography.
4. Removal of Ca^{2+} and Mg^{2+} hardness from given water sample using ion exchange column.
5. Determination of chloride content in given water sample.
6. Calculate the strength of strong acid by titrating it with strong base using conductometer.
7. Calculate the emf value of given cell.
8. To prepare the of urea formaldehyde and phenol formaldehyde resin.
9. To determine the rate constant of a reaction.
10. To Prepare iodoform.
11. Calculate the saponification value / acid value of given oil sample.
12. Chemical analysis of two anions and two cations in given sample of salt.
13. Determination of the partition coefficient of a substance between two immiscible liquids.
14. To determine the total hardness of given water sample by EDTA method.

Note: At least 08 experiments are to be performed by the students.

Suggested Books:
1. A Text book on Experiments and Calculation –Engineering Chemistry by S.S.Dara, S.Chand & Company Ltd.
2. Essentials of Analytical Chemisty, Shobha Ramakrishnan, Pearson Education.
3. Essential of Experimental Engineering chemistry, Shashi Chawla, Dhanpat Rai Publishing Co.
4. Theory & Practice Applied Chemistry – O.P.Virmani, A.K. Narula (New Age).
5. Engineering Chemistry, K.Sesha Maheswaramma and Mridula Chugh, Pearson Education.

Course code	EEE-101P				
Category	Engineering Science Course				
Course title	**Basics of Electrical and Electronics Engineering (P)**				
Scheme and Credits	L	T	P	Credits	
	0	0	2	1	
Class work	50 Marks				
Exam	**50 Marks**				
Total	**100 Marks**				
Duration of Exam	03 Hours				

Note: At least 8 experiments are to be performed by the students.

List of Subject related Experiments:

1. Verify that resistance of conductor is directly proportional to resistivity and length and inversely proportional to cross- sectional area of the conductor.

2. Verification of Ohm's Law, Kirchhoff current and voltage laws

3. Verification of temperature co-efficient of resistance: (i) Positive for Tungsten and Nichrome and (ii) Negative for carbon.

4. To measure DC voltage and current, AC voltage and current with multi-meter

5. To observe waveforms on oscilloscope, measure basic parameters amplitude and frequency of sine wave and square wave.

6. Obtain VI characteristics of semiconductor rectifier diode, LED, Photo-diode

7. To observe waveform at the output of half wave rectifier with and without filter capacitor.

8. To observe waveform at the output of full wave rectifier with and without filter capacitor.

9. To experimentally plot the input and output characteristics of a given BJT transistor in CE configuration and calculate its various parameters.
10. To experimentally plot the input and output characteristics of a given BJT transistor in CB configuration and calculate its various parameters.
11. To study the transfer and drain characteristics of JFET and calculate its various parameters.
12. To study the transfer and drain characteristics of MOSFET and calculate its various parameters.

Course code	CSE-101P				
Category	Professional Core Course				
Course title	Programming for Problem Solving Using C (P)				
Scheme and Credits	L	T	P	Credits	
	0	0	2	1	
Class work	50 Marks				
Exam	50 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

Note: At least 6 experiments are to be performed by the students.

List of Subject related Experiments:

Laboratory Outcomes

- To formulate the algorithms for simple problems
- To translate given algorithms to a working and correct program
- To be able to correct syntax errors as reported by the compilers
- To be able to identify and correct logical errors encountered at run time
- To be able to write iterative as well as recursive programs
- To be able to represent data in arrays, strings and structures and manipulate them through a program

Tutorial 1: Problem solving using computers:
Lab1: Familiarization with programming environment

Tutorial 2: Variable types and type conversions:
Lab 2: Simple computational problems using arithmetic expressions

Tutorial 3: Branching and logical expressions:
Lab 3: Problems involving if-then-else structures

Tutorial 4: Loops, while and for loops:
Lab 4: Iterative problems e.g., sum of series
Tutorial 5: 1D Arrays
Lab 5: 1D Array manipulation

Tutorial 6: 2D arrays and Strings
Lab 6: Matrix problems, String operations

Tutorial 7: Functions, call by value:
Lab 7: Simple functions

Course code	MEE - 104P				
Category	Engineering Science Course				
Course title	Engineering Drawing (P)				
Scheme and Credits	L	T	P	Credits	
	1	0	3	2.5	
Class work	50 Marks				
Exam	50 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

Course Outcomes:

On completion of this course, the students will be able to:

- Introduction to engineering design and its place in society
- Exposure to the visual aspects of engineering design
- Exposure to engineering graphics standards
- Exposure to solid modeling

UNIT-I

Module 1: Introduction to Engineering Drawing

Principles of Engineering Graphics and their significance, usage of Drawing instruments, lettering, Conic sections including the Rectangular Hyperbola (General method only); Cycloid, Epicycloid, Hypocycloid and Involute; Scales – Plain, Diagonal and Vernier Scales.

Module2: Orthographic Projections

Principles of Orthographic Projections-Conventions - Projections of Points and lines inclined to both planes; Projections of planes inclined Planes –Auxiliary Planes;

UNIT-II

Module3: Projections of Regular Solids

Those inclined to both the Planes- Auxiliary Views; Draw simple annotation, dimensioningand scale.Floor plans that include: windows, doors, and fixtures such as WC, bath, sink, shower, etc.

Module4: Sections and Sectional Views of Right Angular Solids

Prism, Cylinder, Pyramid, Cone – Auxiliary Views; Development of surfaces of RightRegular Solids - Prism, Pyramid, Cylinder and Cone; Draw the sectional orthographic views of geometrical solids, objects from industry and dwellings(foundation to slab only)

Module5: Isometric Projections

Principles of Isometric projection – Isometric Scale, Isometric Views, Conventions;Isometric Views of lines, Planes, Simple and compound Solids; Conversion of IsometricViewsto OrthographicViews andVice-versa,Conventions;

UNIT- III

Module6: Overview of Computer Graphics

Listing the computer technologies that impact on graphical communication, Demonstrating knowledge of the theory of CAD software [such as: The Menu System, Toolbars (Standard, Object Properties, Draw, Modify and Dimension), Drawing Area(Back ground, Crosshairs, Coordinate System),Dialog boxes and windows, Shortcut menus (Button Bars), The Command Line(where applicable),The Status Bar, Different methods of zoom as used in CAD, Select and eraseobjects.; IsometricViews of lines,Planes,Simple andcompound Solids]

UNIT-IV

Module7: Annotations, layering & other functions

Applying dimensions to objects, applying an notations to drawings; layers to create drawings, orthographic projection techniques; Drawing sectional views of composite right regular geometric solidsand project the true shape of the sectioned surface; Drawing annotation, Computer-aided design (CAD) software modeling of parts and assemblies.

Drawing of Engineering objects like coupling, crank shaft, pulley.

Module8: Demonstration of a simple team design project that illustrates

Geometry and topology of engineered components, Applying colour coding according to building drawing practice; Drawing sectional elevation showing foundation to ceiling; Introduction to Building Information Modelling (BIM).

SuggestedText/ReferenceBooks:

(i) Shah, M.B. & Rana B.C., Engineering Drawing, Pearson Education
(ii)Bhatt N.D., Panchal V.M. & Ingle P.R., (2014), Engineering Drawing, Charotar Publishing House
(iii) A grawal B. & Agrawal C. M.(2012), Engineering Graphics, TMH Publication
(iv) Narayana, K.L. & P Kannaiah (2008), Text book on Engineering Drawing, Scitech Publishers
(v) CAD Software Theory and User Manuals

Course code	MEE-102P				
Category	Engineering Science Course				
Course title	Workshop Practices (P)				
Scheme and Credits	L	T	P	Credits	
	1	0	3	2.5	
Class work	50 Marks				
Exam	50 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

Objectives of the course

1. To impart fundamental Knowledge of engineering practices such as fitting, wood working, foundry, machining, welding, etc. for manufacturing a product.
2. To prepare the students to understand the various tools and equipment's used in these processes and their working principle
3. To impart fundamental Knowledge of Lathe machine
4. To able to understand the basic knowledge of various welding processes

Class Work

Introduction:

Introduction to Manufacturing Processes and their Classification, Introduction to additive manufacturing, Industrial Safety.

Machining Shop

Lathe, description of lathe: headstock, tailstock, gearbox, carriage, apron, cutting speed, feed & depth of cut, cutting tools, Chucks: 3 jaw, 4 jaw.

Fitting shop:

Introduction, classification of metals: ferrous and nonferrous, fitting tools: measuring and marking tools, marking schemes for a fitting jobs, cutting tools.

Carpentry shop:

Introduction of carpentry, types of woods, carpentry tolls: measuring tools, marking tolls, cutting tools: saws, chisels, planning tools, drilling tools, striking tools, drilling tools, wood working joints, wood working lathe.

Foundry Shop

Introduction, foundry hand tools, measuring boxes, ladle, moulding, furnaces,Pattern: Types of Pattern and Allowances

Welding Shop

Introduction to welding, Classification of Welding Processes,Arc welding & Gas welding equipment's.

Reference Books:

1. S K Hajra Choudhury, Nirjhar Roy, A K Hajra Choudhury, Elements of workshop Technology (vol. 1&2), Media Promoters.
2. B S Raghuwanshi, A Course in Workshop Technology (manufacturing Process vol. 1& 2) Dhanpat Rai & CO.
3. O.P. Khanna, Workshop Technology. Dhanpat Rai Publication.
4. W A J Chapman, Workshop technology in SI unit (part – 1 &2), Mc Graw Hill Education.
5. M.P. GROOVER, Principles of Modern Manufacturing, Wiley.
6. Kalpakjian, Manufacturing Process for Engineering Materials, Pearson Education India.

Lab Work

List of Experiments

1. To study different types of measuring tools used in metrology and determine least counts of vernier callipers, micrometres and vernier height gauges.

2. To study different types of machine tools (lathe, shaper, planer, milling, drilling machines)

3. To prepare a job on a lathe involving like facing, outside turning, taper turning, step turning, radius making and parting-off.

4. To study different types of fitting tools and marking tools used in fitting practice.

5. To prepare a job made out of MS Flats, making saw – cut filling V-cut taper at the corners.

6. To prepare lay out on a metal sheet by making and prepare rectangular tray pipe shaped components e.g. funnel.

7. To prepare joints for welding suitable for butt welding and lap welding.

8. To study various types of carpentry tools and prepare simple types of at least two wooden joints.

9. To prepare simple engineering components/shapes by forging.

10. To prepare mold and core assembly.

11. To prepare horizontal surface/vertical surface/curved surface/slats or V-grooves on a shaper/planner.

12. To prepare a job involving side and face milling on a milling

13. To prepare a job on CNC Machine/Additive Manufacturing.

Note : At least eight experiments/jobs are to be performed/prepared by the students in the semester.

Gurugram University

Scheme of Studies and Examination

Bachelor of Technology (SCHEME A3) Semester-2

Sr. No.	Course Code	Course Title	Hours per week			Total Contact Hrs. per week	Credit
			L	T	P		
1.	BSM-104	Mathematics-II	3	1	0	4	4
2.	HSV-102	Human Value & Soft Skills	2	0	2	4	3
3.	EEE-101 OR BSC-101	Basics of Electrical and Electronics Engineering OR Chemistry	3	0	0	3	3
4.	BSP-103	Physics	3	1	0	4	4
5.	MEE-106	Engineering Mechanics	3	1	0	4	4
6.	EEE-101P OR BSC-101P	Basics of Electrical and Electronics Engineering (P) OR Chemistry (P).	0	0	2	2	1
7.	BSP-103P	Physics (P)	0	0	2	2	1
8.	MEE-102P OR MEE-104P	Workshop Practices (P) OR Engineering Drawing	1	0	3	4	2.5
Total						**27**	**22.5**

Course code	BSM-104				
Category	Basic Science Course				
Course title	Mathematics-II				
Scheme and Credits	L	T	P	Credits	
	3	1	0	4	
Class work	30 Marks				
Exam	70 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

Objectives of the course

4. Demonstrate their understanding of mathematical ideas from multiple perspectives.
5. To develop logical understanding of the subject
6. To develop mathematical skill so that students are able to apply mathematical methods & principals in solving problem from Engineering fields.
7. To make aware students about the importance and symbiosis between Mathematics and Engineering.

Unit-I

Ordinary Differential Equations: Exact differential equations, Equations reducible to exact differential equations, Applications of differential equations of first order & first degree to simple electric circuits, Newton's law of cooling, Heat flow and Orthogonal trajectories, Linear Differential equations of second and higher order, Complete solution, Complementary function and Particular integral, Method of variation of parameters to find particular integral, Cauchy's and Legendre's linear equations.

Unit-II

Laplace Transforms and its Applications: Laplace transforms of elementary functions, Properties of Laplace transforms, Existence conditions, Transforms of derivatives, Transforms of integrals, Multiplication by tn , Division by t, Evaluation of integrals by Laplace transforms, Laplace transform of unit step function, Unit impulse function and Periodic function, Inverse transforms.

Unit-III

Partial Differential Equations: Formation of partial differential equations, Lagrange' linear partial differential equation, First order non-linear partial differential equation, Charpit's method, Method of separation of variables

Unit-IV

Basic Statistics: Measures of Central tendency: Mean, Median, Mode, Measures of Dispersion, Moments, Skewness and Kurtosis, Moments, Variance of a sum, Correlation coefficient, Correlation and regression – Rank correlation; Curve fitting by the method of least squares-fitting of straight lines, second degree parabolas and more general curves.

Reference Books:

1) G.B. Thomas and R.L. Finney, Calculus and Analytic geometry, Pearson Education.
2) Erwin kreyszig, Advanced Engineering Mathematics, John Wiley & Sons.
3) Ramana B.V., Higher Engineering Mathematics, Tata McGraw-Hill Publishing Company Limited.
4) B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers.
5) N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications.
6) P. Sivaramakrishna Das and C. Vijyakumari, Engineering Mathematics, Pearson Education.
7) W. E. Boyce and R. C. DiPrima, Elementary Differential Equations and Boundary Value Problems, Wiley India.
8) S. L. Ross, Differential Equations, Wiley India.
9) R. K, Jain and S. R. K. Iyengar, Advanced Engineering Mathematics, Narosa Publication House Private Limited

Course code	HSV-102				
Category	Humanities and Social Sciences				
Course title	Human Values and Soft Skills				
Scheme and Credits	L	T	P	Credits	
	2	0	2	3	
Class work/Practical	30 Marks				
Exam	70 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

Objectives of the course

a. The course aims at developing the desired English language skills of students of Engineering and Technology so that they become proficient in communication to excel in their professional lives. The course has been designed as to enhance their linguistic and communicative competence.
b. Understanding (Clarity) of Human Relationships and Family.
c. Exposure to Issues in Society and nature (larger manmade systems and Nature).

Unit: 1

Motivation and Objectives of Human Values Course, Purpose of Education, Complimentarily of skills and values, how the current education system falls short, Peers Pressure, Social Pressure In various dimensions of life, Concept of Competition and Time Management.

Unit: 2

Concept of Preconditioning, Concept of Natural Acceptance in Human Being, Understanding Relationships, Dealing with anger, Nine universal values in human relationships. Concept of prosperity, idea of Society, Idea of decentralization of politics, economics, education, justice etc., Its comparison with centralized systems, Balance in nature.

Unit: 3

Techniques of Good Writing , Writing self assessment tasks, Precis writing and note making. Paragraph and Essay writing, Article writing and summarizing

Unit: 4

Business Communication: Formal and Informal Letter writing, Statement of Purpose, Job application & CV (summary statement of academic & professional profiles) and Power point presentations through relevant slides.

English Lab Activity: Blog Writing/Creating a Newsletter, Script writing & enacting for a street play. Develop negotiating skills by using appropriate language of courtesy, Recording individual efforts and holding paired interactions and Group Discussions, Preparing and practising for Interviews.

Suggested reference books

Recommended Readings:

1. Bhatnagar, Nitin andMamtaBhatnagar.Communicative English for Engineers and Professionals.Pearson Education, 2013.
2. Swan, Michael.Practical English Usage. OUP, 1995.
3. Gangal, J.K. Practical Course in Spoken English. New Delhi: PHI Learning, 2015.
4. Konar,Nira. Communication Skills for Professionals. New Delhi: PHI Learning Pvt. Ltd., 2009.
5. Bansal, R.K. and J.B. Harrison. Spoken English. Orient Longman, 1983.
6. Sharma, Sangeeta and Binod Mishra. Communication Skills for Engineers and Scientists. Delhi: PHI Learning Pvt. Ltd., 20
7. Annie Leonard, `` The Story of Stuff,'' Free Press
8. Mohandas Karamchand Gandhi,`` The Story of My Experiments with Truth," Beacon Press
9. J Krishnamurthy,`` On Education," Official repository
10. Hermann Hesse ,`` Siddhartha," Bantam Books
11. ThichNhatHanh,`` Old Path White Clouds," Parallex Press
12. On Education - The Mother Aurobindo Ashram Publication

Course code	EEE-101				
Category	**Engineering Science Course**				
Course title	**Basics of Electrical and Electronics Engineering**				
Scheme and Credits	L	T	P	Credits	
	3	**0**	**0**	3	
Class work	**30 Marks**				
Exam	**70 Marks**				
Total	**100 Marks**				
Duration of Exam	**03 Hours**				

Objectives of the course

To provide basic knowledge of different elements of electrical and electronics engineering field.
To familiarize the students with the concepts of electrical circuits and network Analysis.

To understand the basics of AC and DC circuits.

To familiarize students to the analysis and design of analog electronic circuits which form the basic building blocks of almost any electronic system.

To introduce p-n junction theory, operation of the semiconductor devices and their use in basic electronic circuits.

Unit: 1
DC Circuits

Role and importance of circuits in Engineering, Concept of fields, charge, current, voltage, energy and their interrelationships. Electrical circuit elements (R, L and C), voltage and current sources(ideal & Controlled),series and parallel circuits, Network reduction: voltage and current division Kirchhoff current and voltage laws with their applications (Nodal and Mesh Analysis), Source transformation - star delta conversion. Superposition theorem, Thevenin and Norton Theorems, Millman,Substitution and Reciprocity theorem.

Unit: 2
AC Circuits

Representation of sinusoidal waveforms, average, peak and rms values, complex representation of impedance, phasor representation, complex power, real power, reactive power, apparent power, power factor and Energy, Analysis of single-phase ac circuits consisting of R, L, C, RL, RC, RLC combinations (series and parallel),Resonance; Introduction to three- phase circuits

Unit: 3

Introduction to p-n junction diode and its pplications. Half wave & full wave rectifiers. clipping and clamping circuits, Varactor, Varistor, Voltage Regulator

Bipolar junction transistors and its biasing BJT operation, BJT voltages and currents, CE, CB and CC characteristics, DC load line and bias point, base bias, emitter feedback bias, collector feedback bias, voltage divider bias, Thermal stability, biasing BJT switching circuits, transistor power dissipation and switching time, Testing of bipolar junction transistor with multi-meter, Reading datasheet of BJT.

Unit: 4

Field Effect Devices: JFET : basic Operation and characteristics, drain and transfer characteristics, pinch off voltage, parameters of JFET: Transconductance (gm), ac drain resistance (rd), amplification factor(μ) ,Small Signal Model & Frequency Limitations. MOSFET: basic operation, depletion and enhancement type, pinch-off voltage, Shockley equation and Small Signal Model of MOSFET, MOS capacitor.

Suggested books:

1. E. Huges, "Electrical Technology", ELBS.
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3. M.M. Mano: Digital Logic Design, Phi.

Suggested reference books

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3. A. Sedra and C. Smith, Microelectronic Circuits: Theory and Applications, Oxford University Press, 6th Edition, 2013.
4. Boylestad and Nashelsky, "Electronic Devices and Circuit Theory" Pearson publishers, 10th Edition
5. R.P. Jain: Modern Digital Electronics, Tmh.
6. Malvino and Leach, " Digital Principles and Applications", TMH publishers, 8th Edition
7. Tyagi M.S., "Introduction to Semiconductor Materials and Devices", John Wiley & Sons, 1993.
8. Basic Electrical Engineering, A.E. Fitzgerald , David Higginbotham 2009 , Arvin Grabel, Tata McGraw-Hill Publishing Company; 5th Edition.

Course code	BSC-101				
Category	BASIC SCIENCE COURSES				
Course title	Chemistry				
Scheme and Credits	L	T	P	Credits	
	3	0	0	3	
Class work	30Marks				
Theory Exam	70 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

Course Objective:

1. To analyse microscopic chemistry
2. Understand the concept of hardness of water and phenomenon of corrosion
3. Rationalise periodic properties
4. Distinguish the ranges of the electromagnetic spectrum

UNIT-I

Atomic and molecular structure: Schrodinger equation (Introduction and concept only). Forms of the hydrogen atom wave functions and the plots of these functions to explore their spatial variations (derivation excluded). Molecular orbital energy level diagrams of diatomic molecules. Pi-molecular orbitals of butadiene and benzene. Crystal field theory and the energy level diagrams for transition metal ions.

UNIT-III

Periodic properties: Effective nuclear charge, penetration of orbitals, variations of s, p, d and f orbital energies of atoms in the periodic table, electronic configurations, atomic and ionic sizes,ionization energies, electron affinity and electronegativity, polarizability, oxidation states.

UNIT-III

Stereochemistry: Representations of 3 dimensional structures, structural isomers and stereoisomers, configurations, symmetry and chirality, enantiomers, diastereomers, optical activity, absolute configurations and conformational analysis.

Organic reactions: Introduction to reactions involving substitution, addition, elimination, oxidation, reduction, cyclization (mechanism excluded).

UNIT-IV

Intermolecular forces: Ionic, dipolar and Van der Waals interactions.

Water Chemistry: Hardness of water- Introduction, Types, Measurement of hardness by EDTA method, Methods of water softening (Lime soda process, Zeolite Process, Demineralisation process).

Suggested Text Books:

(i) University Chemistry, Bruce M. Mahan, Pearson Education.
(ii) Chemistry: Principles and Applications, by M. J. Sienko and R. A. Plane
(iii) Essentials of Analytical Chemistry, Shobha Ramakrishnan and Banani Mukhopadhyay, Pearson Education.
(iv)Fundamentals of Molecular Spectroscopy, by C. N. Banwell
(v) Engineering Chemistry (NPTEL Web-book), by B. L. Tembe, Kamaluddin and M. S. Krishnan
(vi) Physical Chemistry, by P. W. Atkins
(vii) Organic Chemistry: Structure and Function by K. P. C. Volhardt and N. E. Schore, 5th Edition.

Course Outcomes:

The course will enable the student to:

- Analyse microscopic chemistry in terms of atomic and molecular orbitals and intermolecular forces.
- Understand the concept of hardness of water and phenomenon of corrosion.
- Distinguish the ranges of the electromagnetic spectrum used for exciting different molecular energy levels in various spectroscopic techniques.
- Rationalise periodic properties such as ionization potential, electronegativity, oxidation states and electron affinity.

Course code	BSP-103				
Category	**Basic Science Course**				
Course title	**Physics**				
Scheme and Credits	**L**	**T**	**P**	**Credits**	
	3	**1**	**0**	**4**	
Class work	**30 Marks**				
Exam	**70 Marks**				
Total	**100 Marks**				
Duration of Exam	**03 Hours**				

Objectives of the course

1. To impart knowledge of basic concepts in applied physics
2. To enhance the analytical capability of the engineering students.
3. To givea balance account of the fundamentals of Physics as well as some of recent developments in this area best suited to the Engineering applications in different branches and to provide the knowledge and methodology necessary for solving problems in the field of engineering.

UNIT – I

Electrostatics in vacuum and linear dielectric medium

Calculation of electric field and electrostatic potential for a charge distribution; Divergence and curl of electrostatic field; Laplace's and Poisson's equations for electrostatic potential Boundary conditions of electric field and electrostatic potential; energy of a charge distribution and its expression in terms of electric field. Electrostatic field and potential of a dipole. Bound charges due to electric polarization; Electric displacement; boundary conditions on displacement.

UNIT – II

Electromagnetism and Magnetic Properties of Materials

Laws of electrostatics, electric current and the continuity equation, laws of magnetism. Ampere's Faraday's laws. Maxwell's equations. Polarisation, permeability and dielectric constant, polar and non-polar dielectrics, applications of dielectric Magnetisation, permeability and susceptibility, classification of magnetic materials, ferromagnetism, magnetic domains and hysteresis, applications.

UNIT – III

Wave Optics and Lasers

Wave Optics: Huygens' principle, superposition of waves and interference of light by wave-front splitting and amplitude splitting; Young's double slit experiment, Newton's rings, Michelson interferometer. Fraunhofer diffraction from a single slit and a circular aperture, the Rayleigh criterion for limit of resolution and its application to vision; Diffraction gratings and their resolving power.

Lasers: Einstein's theory of matter radiation interaction and A and B coefficients; amplification of light by population inversion, different types of lasers: gas lasers (He-Ne, CO), solid-state lasers (ruby, Neodymium), dye lasers; Properties of laser beams: mono-chromaticity.

UNIT – IV

Introduction to Solids and Semiconductors

Free electron theory of metals, Fermi level, density of statesin1, 2 and 3 dimensions, Bloch's theorem for particles in a periodic potential, Kronig-Penney model and origin of energy bands. Types of electronic materials: metals, semiconductors, and insulators. Intrinsic and extrinsic semiconductors, Dependence of Fermi level on carrier-concentration and temperature (equilibrium carrier statistics), Carrier generation and recombination, Carrier transport: diffusion and drift, p -n junction.

Suggested reference books

1. E. Hecht, "Optics", Pearson Education
2. D. J. Griffiths, "Quantum mechanics", Pearson Education
3. B.G. Streetman, "Solid State Electronic Devices", Pearson Education
4. G. Main, "Vibrations and waves in physics", Cambridge University Press
5. H. J. Pain, "The physics of vibrations and waves", Wiley
6. A. Ghatak, "Optics", McGraw Hill Education,
7. O. Svelto, "Principles of Lasers", Springer Science & Business Media,
8. R. Robinett, "Quantum Mechanics", OUP Oxford
9. D. McQuarrie, "Quantum Chemistry", University Science Books
10. D. A. Neamen, "Semiconductor Physics and Devices", Times Mirror High Education Group, Chicago
11. E.S. Yang, "Microelectronic Devices", McGraw Hill, Singapore

Course code	MEE-106				
Category	Program Core Course				
Course title	Engineering Mechanics				
Scheme and Credits	L	T	P	Credits	
	3	1	0	4	
Class work	30 Marks				
Exam	70 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

Course Outcomes (COs):

At the end of the course, the student shall be able to:

1. Understand the basic force system.
2. Apply principles of particle kinematics.
3. Grasp the concepts of particle dynamics.
4. Learn energy methods & momentum methods.

UNIT-I

Introduction: Force system, dimensions and units in mechanics, laws of mechanics, vector algebra, addition and subtraction of forces, cross and dot products of vectors, moment of a force about a point and axis, couple and couple moment, transfer of a force to a parallel position, resultant of a force system using vector method, Problems involving vector application

Equilibrium: Static and dynamic equilibrium, static in determinacy, general equations of equilibrium, Varingnon's theorem, Lami's theorem, equilibrium of bodies under a force system, Problems.

UNIT-II

Truss and Frames: Truss, classification of truss, assumptions in truss analysis, perfect truss, analysis of perfect plane truss using method of joints and method of sections, Problems.Centroid , Centre of mass and Centre of gravity, Determination of centroid, centre of mass and centre of gravity by integration method of regular and composite figures and solid objects, Problems.

UNIT-III

Moment of Inertia: Area moment of inertia, mass moment of inertia, parallel axis andperpendicular axis theorems, radius of gyration, polar moment of inertia, product of inertia, principle axis, problem based on composite figures and solid objects.

Kinematics: Concept of rigid body, velocity and acceleration, relative velocity, translation and rotation of rigid bodies, equations of motion for translation and rotation, problems.

UNIT-IV

Particle Dynamics: Energy methods and momentum methods, Newton's laws, work energy Equation for a system of particles, linear and angular momentum equations, projectile motion, problem. Shear Force and Bending Moment Diagram for statically determinant beams classification Of beams, types of loads, shear force and bending moment calculation and their graphical presentation, point of inflection, problem.

RecommendedBooks:-

- Engineering Mechanics– Irving H. Shames, PHI Publication
- Engineering Mechanics–U.C. Jindal, Galgotia Publication
- Engineering Mechanics–A.K.Tayal, Umesh Publication

Course code	EEE-101P				
Category	Engineering Science Course				
Course title	**Basics of Electrical and Electronics Engineering (P)**				
Scheme and Credits	L	T	P	Credits	
	0	0	2	1	
Class work	50 Marks				
Exam	**50 Marks**				
Total	**100 Marks**				
Duration of Exam	03 Hours				

Note: At least 8 experiments are to be performed by the students.

List of Subject related Experiments:

1. Verify that resistance of conductor is directly proportional to resistivity and length and inversely proportional to cross- sectional area of the conductor.

2. Verification of Ohm's Law, Kirchhoff current and voltage laws

3. Verification of temperature co-efficient of resistance: (i) Positive for Tungsten and Nichrome and (ii) Negative for carbon.

4. To measure DC voltage and current, AC voltage and current with multi-meter

5. To observe waveforms on oscilloscope, measure basic parameters amplitude and frequency of sine wave and square wave.

6. Obtain VI characteristics of semiconductor rectifier diode, LED, Photo-diode

7. To observe waveform at the output of half wave rectifier with and without filter capacitor.

8. To observe waveform at the output of full wave rectifier with and without filter capacitor.

9. To experimentally plot the input and output characteristics of a given BJT transistor in CE configuration and calculate its various parameters.
10. To experimentally plot the input and output characteristics of a given BJT transistor in CB configuration and calculate its various parameters.
11. To study the transfer and drain characteristics of JFET and calculate its various parameters.
12. To study the transfer and drain characteristics of MOSFET and calculate its various parameters.

Course code	BSC-101P				
Category	BASIC SCIENCE COURSES				
Course title	Chemistry (P)				
Scheme and Credits	L	T	P	Credits	
	0	0	2	1	
External Practical	50 Marks				
Internal Practical	50 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

Course Objective:
The chemistry laboratory course will consist of experiments illustrating the principles of chemistry relevant to the study of science and engineering.

LIST OF EXPERIMENTS: -
1. Determination of surface tension of given liquid by drop number method.
2. Determine the viscosity of given liquid by using Ostwald's viscometer / Redwood viscometer.
3. Calculate the Rf value of given sample using Thin layer chromatography / Paper chromatography.
4. Removal of Ca^{2+} and Mg^{2+} hardness from given water sample using ion exchange column.
5. Determination of chloride content in given water sample.
6. Calculate the strength of strong acid by titrating it with strong base using conductometer.
7. Calculate the emf value of given cell.
8. To prepare the of urea formaldehyde and phenol formaldehyde resin.
9. To determine the rate constant of a reaction.
10. To Prepare iodoform.
11. Calculate the saponification value / acid value of given oil sample.
12. Chemical analysis of two anions and two cations in given sample of salt.
13. Determination of the partition coefficient of a substance between two immiscible liquids.
14. To determine the total hardness of given water sample by EDTA method.

Note: At least 08 experiments are to be performed by the students.

Suggested Books:
1. A Text book on Experiments and Calculation –Engineering Chemistry by S.S.Dara, S.Chand & Company Ltd.
2. Essentials of Analytical Chemisty, Shobha Ramakrishnan, Pearson Education.
3. Essential of Experimental Engineering chemistry, Shashi Chawla, Dhanpat Rai Publishing Co.
4. Theory & Practice Applied Chemistry – O.P.Virmani, A.K. Narula (New Age).
5. Engineering Chemistry, K.Sesha Maheswaramma and Mridula Chugh, Pearson Education.

PHYSICS Lab

Course code	BSP-103P				
Category	**Basic Science Course**				
Course title	**Physics (P)**				
Scheme and Credits	**L**	**T**	**P**	**Credits**	
	0	**0**	**2**	**1**	
Class work	**50 Marks**				
Exam	**50 Marks**				
Total	**100 Marks**				
Duration of Exam	**03 Hours**				

Note: At least 8 experiments are to be performed by the students.

List of Subject related Experiments:

1. To find out wavelength of monochromatic light using Newton's ring experiment.
2. To find out wavelength of monochromatic light using Diffraction grating.
3. To find out wavelength of monochromatic light using Freshnel's bi-prism
4. To study interference phenomena using Michelson's Interferometer and to find out wavelength of monochromatic light.
5. To study Hall effect in semiconductors and measure the Hall coefficient.
6. To find frequency of AC mains using sonometer.
7. To study the magnetic properties of materials using B-H curve.
8. To study the Curies temperature of materials using Dielectric set up.
9. To verify the inverse square law with the help of a photovoltaic cell.
10. To determine Planks constant using photocell.
11. To study the characteristics of Solar cell and find out the fill factor.
12. To find temperature co-efficient of platinum using Callender Griffith bridge.
13. To study the forward and reverse characteristics of P-N junction diode.

Course code	MEE-102P				
Category	Engineering Science Course				
Course title	Workshop Practices (P)				
Scheme and Credits	L	T	P	Credits	
	1	0	3	2.5	
Class work	50 Marks				
Exam	50 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

Objectives of the course

5. To impart fundamental Knowledge of engineering practices such as fitting, wood working, foundry, machining, welding, etc. for manufacturing a product.
6. To prepare the students to understand the various tools and equipment's used in these processes and their working principle
7. To impart fundamental Knowledge of Lathe machine
8. To able to understand the basic knowledge of various welding processes

Class Work

Introduction:

Introduction to Manufacturing Processes and their Classification, Introduction to additive manufacturing, Industrial Safety.

Machining Shop

Lathe, description of lathe: headstock, tailstock, gearbox, carriage, apron, cutting speed, feed & depth of cut, cutting tools, Chucks: 3 jaw, 4 jaw.

Fitting shop:

Introduction, classification of metals: ferrous and nonferrous, fitting tools: measuring and marking tools, marking schemes for a fitting jobs, cutting tools.

Carpentry shop:

Introduction of carpentry, types of woods, carpentry tolls: measuring tools, marking tolls, cutting tools: saws, chisels, planning tools, drilling tools, striking tools, drilling tools, wood working joints, wood working lathe.

Foundry Shop

Introduction, foundry hand tools, measuring boxes, ladle, moulding, furnaces,Pattern: Types of Pattern and Allowances

Welding Shop

Introduction to welding, Classification of Welding Processes,Arc welding & Gas welding equipment's.

Reference Books:

7. S K Hajra Choudhury, Nirjhar Roy, A K Hajra Choudhury, Elements of workshop Technology (vol. 1&2), Media Promoters.
8. B S Raghuwanshi, A Course in Workshop Technology (manufacturing Process vol. 1& 2) Dhanpat Rai & CO.
9. O.P. Khanna, Workshop Technology. Dhanpat Rai Publication.
10. W A J Chapman, Workshop technology in SI unit (part – 1 &2), Mc Graw Hill Education.
11. M.P. GROOVER, Principles of Modern Manufacturing, Wiley.
12. Kalpakjian, Manufacturing Process for Engineering Materials, Pearson Education India.

Lab Work

List of Experiments

1. To study different types of measuring tools used in metrology and determine least counts of vernier callipers, micrometres and vernier height gauges.

2. To study different types of machine tools (lathe, shaper, planer, milling, drilling machines)

3. To prepare a job on a lathe involving like facing, outside turning, taper turning, step turning, radius making and parting-off.

4. To study different types of fitting tools and marking tools used in fitting practice.

5. To prepare a job made out of MS Flats, making saw – cut filling V-cut taper at the corners.

6. To prepare lay out on a metal sheet by making and prepare rectangular tray pipe shaped components e.g. funnel.

7. To prepare joints for welding suitable for butt welding and lap welding.

8. To study various types of carpentry tools and prepare simple types of at least two wooden joints.

9. To prepare simple engineering components/shapes by forging.

10. To prepare mold and core assembly.

11. To prepare horizontal surface/vertical surface/curved surface/slats or V-grooves on a shaper/planner.

12. To prepare a job involving side and face milling on a milling

13. To prepare a job on CNC Machine/Additive Manufacturing.

Note : At least eight experiments/jobs are to be performed/prepared by the students in the semester.

Course code	MEE - 104P				
Category	Engineering Science Course				
Course title	Engineering Drawing (P)				
Scheme and Credits	L	T	P	Credits	
	1	0	3	2.5	
Class work	50 Marks				
Exam	50 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

Course Outcomes:

On completion of this course, the students will be able to:

- Introduction to engineering design and its place in society
- Exposure to the visual aspects of engineering design
- Exposure to engineering graphics standards
- Exposure to solid modeling

UNIT-I

Module 1: Introduction to Engineering Drawing

Principles of Engineering Graphics and their significance, usage of Drawing instruments, lettering, Conic sections including the Rectangular Hyperbola (General method only); Cycloid, Epicycloid, Hypocycloid and Involute; Scales – Plain, Diagonal and Vernier Scales.

Module2: Orthographic Projections

Principles of Orthographic Projections-Conventions - Projections of Points and lines inclined to both planes; Projections of planes inclined Planes –Auxiliary Planes;

UNIT-II

Module3: Projections of Regular Solids

Those inclined to both the Planes- Auxiliary Views; Draw simple annotation, dimensioning and scale. Floor plans that include: windows, doors, and fixtures such as WC, bath, sink, shower, etc.

Module4: Sections and Sectional Views of Right Angular Solids

Prism, Cylinder, Pyramid, Cone – Auxiliary Views; Development of surfaces of Right Regular Solids - Prism, Pyramid, Cylinder and Cone; Draw the sectional orthographic views of geometrical solids, objects from industry and dwellings(foundation to slab only)

Module5: Isometric Projections

Principles of Isometric projection – Isometric Scale, Isometric Views, Conventions; Isometric Views of lines, Planes, Simple and compound Solids; Conversion of Isometric Views to Orthographic Views and Vice-versa, Conventions;

UNIT- III

Module6: Overview of Computer Graphics

Listing the computer technologies that impact on graphical communication, Demonstrating knowledge of the theory of CAD software [such as: The Menu System, Toolbars (Standard, Object Properties, Draw, Modify and Dimension), Drawing Area(Back ground, Crosshairs, Coordinate System),Dialog boxes and windows, Shortcut menus (Button Bars), The Command Line(where applicable),The Status Bar, Different methods of zoom as used in CAD, Select and eraseobjects.; IsometricViews of lines,Planes,Simple andcompound Solids]

UNIT-IV

Module7: Annotations, layering & other functions

Applying dimensions to objects, applying an notations to drawings; layers to create drawings, orthographic projection techniques; Drawing sectional views of composite right regular geometric solids and project the true shape of the sectioned surface; Drawing annotation, Computer-aided design (CAD) software modeling of parts and assemblies.

Drawing of Engineering objects like coupling, crank shaft, pulley.

Module8: Demonstration of a simple team design project that illustrates

Geometry and topology of engineered components, Applying colour coding according to building drawing practice; Drawing sectional elevation showing foundation to ceiling; Introduction to Building Information Modelling (BIM).

Suggested Text/Reference Books:

(vi) Shah, M.B. & Rana B.C., Engineering Drawing, Pearson Education
(vii) Bhatt N.D., Panchal V.M. & Ingle P.R., (2014), Engineering Drawing, Charotar Publishing House
(viii) A grawal B. & Agrawal C. M.(2012), Engineering Graphics, TMH Publication
(ix) Narayana, K.L. & P Kannaiah (2008), Text book on Engineering Drawing, Scitech Publishers
(x) CAD Software Theory and User Manuals

Gurugram University
Scheme of Studies and Examination
Bachelor of Technology (SCHEME A4) Semester-1

Sr. No.	Course Code	Course Title	Hours per week			Total Contact Hrs. per week	Credit
			L	T	P		
1.	HSE-101	Communication Skills in English	2	0	0	2	2
2.	BSM-103	Mathematics-I	3	1	0	4	4
3.	BSC-101 OR EEE-101	Chemistry OR Basic of Electrical and Electronics Engineering	3 3	0 0	0 0	3	3
4.	CSE-101	Programing for problem solving using C	3	0	0	3	3
5.	ENV-101	Basics of Environmental Science	2	0	0	2	2
6.	HSE-101P	Communication Skills in English (P).	0	0	2	2	1
7.	BSC-101P OR EEE-101P	Chemistry (P) OR Basics of Electrical and Electronics Engineering (P)	0	0	2	2	1
8.	CSE-101P	Programming for Problem solving using C (P)	0	0	2	2	1
9.	MEE-104P OR MEE-102P	Engineering Drawing OR Workshop Practices (P)	1 1	0 0	3 3	4	2.5
10.	AUS-101	Sports (Audit Course) Compulsory	0	0	2	2*	0
Total						**24+2***	**19.5**

Course code	HSE-101				
Category	Humanities and Social Sciences				
Course title	Communication Skills in English				
Scheme and Credits	L	T	P	Credits	
	2	0	0	2	
Class work/ Practical	30 Marks				
Exam	70 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

Objectives of the course:

- **a.** The course will focus on the four integral skills of language, improving the proficiency levels in all of them and to learn to use language as a tool for effective communication.
- **b.** This course will widen the understanding of the learners in all genres of literature (short stories, poetry, autobiographies.) with the help of expository pieces .
- **c.** The course will strive to equip the learner with the ability to express oneself and be understood by others with clarity and precision, in both written and spoken forms.
- **d.** This course will encourage creative use of language through translation, paraphrasing and paragraph writing.
- **e.** Along with the above, the course will also build confidence and encourage the students to use a standard spoken form of English in order to prepare them to face job interviews, workplace and in higher studies.

Unit:1

Remedial English : Parts of speech, Gerunds, Participles and infinitives; Clauses; Sentence constructions (unity; avoidance of choppy and rambling sentences, logic and consistency, conciseness, sequencing of ideas); Sentence errors-agreement between verb and subject, pronoun and antecedents, sequence of tenses, problems involving modifiers (dangling and misplaced modifiers); Shifts in point of view consistency of number and person, tense, mood, voice and subject; Parallelism; Omissions and mixed constructions.

Unit: 2

Vocabulary : Methods of building vocabulary-etmological roots, prefixes and suffixes; Commonly used foreign words and phrases; spelling; words often confused synonyms and homonyms; one word substitutes; verbal idioms.

Unit: 3

Punctuation and Mechanics: End Punctuation; internal Punctuation; Word Punctuation. Comprehension: Abstracting; Summarizing; Observation, Findings and Conclusions; Illustration and Inductive Logic; Deduction and Analogy.

Unit: 4

Presentation: Oral presentation- Extempore, discussion on topics of contemporary relevance, Interviews.

Written Comprehension: The ability to write after listening to and reading select speeches, news bulletins, presentations and answering questions based on what has been heard. Reading the given texts to skim, scan, infer and answer comprehension questions. Reading texts like case studies and project reports for critical assessment and book Review.

Suggested Books:

1. Nitin Bhatnagar and Mamta Bhatnagar, Communicative English for Engineers and Professionals. Pearson Education.
2.Bhatnagar, k. Manmohan. Ed. The Spectrum of Life: An Anthology of Modern Prose. Delhi: Macmillan India Ltd., 2006.
3 C. Murlikrishna & Sunita Mishra, Communication Skills for Engineers, Pearson Ed.
4 Sinha, R.P.Current English Grammar and Usage. OUP.
5.Rizvi, M. Ashraf. Effective Technical Communication. McGraw Hill Education (India) Pvt. Ltd., 2014.
6.Eastwood, John.Oxford Guide to English Grammar.OUP, 2010.
7.Kumar, Sanjay and Pushp Lata. Communication Skills. OUP, 2011.
8. Raman, Meenakshi and Sangeeta Sharma.CommunicationSkills.NewDelhi:OUP,2011.
9.Hill, L.A.A Guide to Correct English.London:OUP,1965.
10.Oxford Dictionary of English Idioms. New Delhi: OUP, 2009
11*http://yousigma.com/religionandphilosophy/swamivivekananda/thescecretofwork.pdf

Course code	BSM-103				
Category	Basic Science Course				
Course title	Mathematics-I				
Scheme and Credits	L	T	P	Credits	
	3	1	0	4	
Class work	30 Marks				
Exam	70 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

Objectives of the course

1. To develop logical understanding of the subject
2. To develop mathematical skill so that students are able to apply mathematical methods & principals in solving problem from Engineering fields.
3. To make aware students about the importance and symbiosis between Mathematics and Engineering.

Unit-I

Matrices & Its Application:

Elementary Matrices, Elementary Transformations, Inverse using elementary transformations, Rank of a matrix, Normal form of a matrix, Linear dependence and independence of vectors, Consistency of linear system of equations, Linear and Orthogonal Transformations, Eigenvalues and Eigenvectors, Properties of eigenvalues, Cayley-Hamilton Theorem, Diagonalization of Matrices.

Unit-II

Sequences and Series:

Convergence of sequence and series, Tests for convergence, Power series: Taylor's series, series for exponential, trigonometric and logarithm functions, Fourier series: Half range sine and cosine series, Parseval's theorem.

Unit-III

Differential Calculus: Limit, Continuity and Differentiability of function of single variable, Successive Differentiation, Leibnitz Theorem, Taylor's and Maclaurin's Series for Single Variable function, Partial derivatives, Homogeneous functions, Euler's Theorem, Jacobian, Maxima-Minima of function of two variables, Lagrange's Method of undetermined multipliers.

Unit-IV

Integral Calculus: Basic concepts of integration and properties of definite integrals, Applications of single integration to find volume of solids and surface area of solids of revolution, Double integral, Change of order of integration, Double integral in Polar Co-ordinates, Applications of double integral to find area enclosed by plane curves, Triple integral, Beta and Gamma functions.

Reference Books:

1. G.B. Thomas and R.L. Finney, Calculus and Analytic geometry, Pearson Education.

2. Erwin Kreyszig, Advanced Engineering Mathematics, John Wiley & Sons.

3. D. Poole, Linear Algebra: A Modern Introduction, Brooks Cole.

4. Ramana B.V., Higher Engineering Mathematics, Tata McGraw-Hill Publishing Company Limited.

5. N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications.

6. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers.

7. V. Krishnamurthy, V.P. Mainra and J. L. Arora, An introduction to Linear Algebra, Affiliated East– West Press Private limited

Course code	BSC-101				
Category	BASIC SCIENCE COURSES				
Course title	Chemistry				
Scheme and Credits	L	T	P	Credits	
	3	0	0	3	
Class work	30Marks				
Theory Exam	70 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

Course Objective:

1. To analyse microscopic chemistry
2. Understand the concept of hardness of water and phenomenon of corrosion
3. Rationalise periodic properties
4. Distinguish the ranges of the electromagnetic spectrum

UNIT-I

Atomic and molecular structure: Schrodinger equation (Introduction and concept only). Forms of the hydrogen atom wave functions and the plots of these functions to explore their spatial variations (derivation excluded). Molecular orbital energy level diagrams of diatomic molecules. Pi-molecular orbitals of butadiene and benzene. Crystal field theory and the energy level diagrams for transition metal ions.

UNIT-III

Periodic properties: Effective nuclear charge, penetration of orbitals, variations of s, p, d and f orbital energies of atoms in the periodic table, electronic configurations, atomic and ionic sizes,ionization energies, electron affinity and electronegativity, polarizability, oxidation states.

UNIT-III

Stereochemistry: Representations of 3 dimensional structures, structural isomers and stereoisomers, configurations, symmetry and chirality, enantiomers, diastereomers, optical activity, absolute configurations and conformational analysis.

Organic reactions: Introduction to reactions involving substitution, addition, elimination, oxidation, reduction, cyclization (mechanism excluded).

UNIT-IV

Intermolecular forces: Ionic, dipolar and Van der Waals interactions.

Water Chemistry: Hardness of water- Introduction, Types, Measurement of hardness by EDTA method, Methods of water softening (Lime soda process, Zeolite Process, Demineralisation process).

Suggested Text Books:

(i) University Chemistry, Bruce M. Mahan, Pearson Education.
(ii) Chemistry: Principles and Applications, by M. J. Sienko and R. A. Plane
(iii) Essentials of Analytical Chemistry, Shobha Ramakrishnan and Banani Mukhopadhyay, Pearson Education.
(iv)Fundamentals of Molecular Spectroscopy, by C. N. Banwell
(v) Engineering Chemistry (NPTEL Web-book), by B. L. Tembe, Kamaluddin and M. S. Krishnan
(vi) Physical Chemistry, by P. W. Atkins
(vii) Organic Chemistry: Structure and Function by K. P. C. Volhardt and N. E. Schore, 5th Edition.

Course Outcomes:

The course will enable the student to:

- Analyse microscopic chemistry in terms of atomic and molecular orbitals and intermolecular forces.
- Understand the concept of hardness of water and phenomenon of corrosion.
- Distinguish the ranges of the electromagnetic spectrum used for exciting different molecular energy levels in various spectroscopic techniques.
- Rationalise periodic properties such as ionization potential, electronegativity, oxidation states and electron affinity.

Course code	EEE-101				
Category	**Engineering Science Course**				
Course title	**Basics of Electrical and Electronics Engineering**				
Scheme and Credits	L	T	P	Credits	
	3	**0**	**0**	3	
Class work	**30 Marks**				
Exam	**70 Marks**				
Total	**100 Marks**				
Duration of Exam	**03 Hours**				

Objectives of the course

To provide basic knowledge of different elements of electrical and electronics engineering field.
To familiarize the students with the concepts of electrical circuits and network Analysis.

To understand the basics of AC and DC circuits.

To familiarize students to the analysis and design of analog electronic circuits which form the basic building blocks of almost any electronic system.

To introduce p-n junction theory, operation of the semiconductor devices and their use in basic electronic circuits.

Unit: 1
DC Circuits

Role and importance of circuits in Engineering, Concept of fields, charge, current, voltage, energy and their interrelationships. Electrical circuit elements (R, L and C), voltage and current sources(ideal & Controlled),series and parallel circuits, Network reduction: voltage and current division Kirchhoff current and voltage laws with their applications (Nodal and Mesh Analysis), Source transformation - star delta conversion. Superposition theorem, Thevenin and Norton Theorems, Millman,Substitution and Reciprocity theorem.

Unit: 2
AC Circuits

Representation of sinusoidal waveforms, average, peak and rms values, complex representation of impedance, phasor representation, complex power, real power, reactive power, apparent power, power factor and Energy, Analysis of single-phase ac circuits consisting of R, L, C, RL, RC, RLC combinations (series and parallel),Resonance; Introduction to three- phase circuits

Unit: 3

Introduction to p-n junction diode and its pplications. Half wave & full wave rectifiers. clipping and clamping circuits, Varactor, Varistor, Voltage Regulator

Bipolar junction transistors and its biasing BJT operation, BJT voltages and currents, CE, CB and CC characteristics, DC load line and bias point, base bias, emitter feedback bias, collector feedback bias, voltage divider bias, Thermal stability, biasing BJT switching circuits, transistor power dissipation and switching time, Testing of bipolar junction transistor with multi-meter, Reading datasheet of BJT.

Unit: 4

Field Effect Devices: JFET : basic Operation and characteristics, drain and transfer characteristics, pinch off voltage, parameters of JFET: Transconductance (gm), ac drain resistance (rd), amplification factor(μ) ,Small Signal Model & Frequency Limitations. MOSFET: basic operation, depletion and enhancement type, pinch-off voltage, Shockley equation and Small Signal Model of MOSFET, MOS capacitor.

Suggested books:

1. E. Huges, "Electrical Technology", ELBS.
2. J. Millman and C. Halkias, Integrated Electronics, McGraw Hill, 2nd Edition, 2009.
3. M.M. Mano: Digital Logic Design, Phi.

Suggested reference books

1. D. P. Kothari and I. J. Nagrath, "Basic Electrical Engineering", Tata McGraw Hill, 2010.
2. V. Del Toro, "Principles of Electrical engineering", PHI.
3. A. Sedra and C. Smith, Microelectronic Circuits: Theory and Applications, Oxford University Press, 6th Edition, 2013.
4. Boylestad and Nashelsky, "Electronic Devices and Circuit Theory" Pearson publishers, 10th Edition
5. R.P. Jain: Modern Digital Electronics, Tmh.
6. Malvino and Leach, " Digital Principles and Applications", TMH publishers, 8th Edition
7. Tyagi M.S., "Introduction to Semiconductor Materials and Devices", John Wiley & Sons, 1993.
8. Basic Electrical Engineering, A.E. Fitzgerald , David Higginbotham 2009 , Arvin Grabel, Tata McGraw-Hill Publishing Company; 5th Edition.

Course code	CSE-101				
Category	Professional Core Course				
Course title	Programming for Problem Solving Using C				
Scheme and Credits	L	T	P	Credits	
	3	0	0	3	
Class work	30 Marks				
Exam	70 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

Unit 1

Introduction to Programming: Idea of Algorithm: Steps to solve logical and numerical problems. Representation of Algorithm: Flowchart/Pseudocode with examples. C Programming: Keywords, Variables and Data Types: basic, derived and user defined, Type Conversions, Header Files, Basic Input and Output Functions and Statements, Compilation, Syntax and Logical Errors in compilation, Object and Executable Code, Storage Classes, Arithmetic Expressions and Precedence.

Unit 2

Preprocessors, Conditional and Branching Statements, Loops/ Iterative Statements, Writing and evaluation of conditionals and consequent branching.

Unit 3

Arrays (1-D, 2-D), Character Arrays and Strings, Arrays with Pointers, Functions (including using built in libraries), Parameter passing in functions, Call by Value, Call by Reference, Passing arrays to functions, Recursion, as a different way of solving problems. Example programs, such as Finding Factorial, Fibonacci series, Ackerman function etc.

Unit 4

Idea of pointers, Defining pointers, Use of Pointers in self-referential structures, Introduction to Dynamic Memory Allocation and its Methods, Structures, Union, Defining Structures and Array of Structures, File Handling.

Suggested Text Books:

Ajay Mittal, Programming in C, 'A Practical Approach', Pearson Education.
Byron Gottfried, Schaum's Outline of Programming with C, McGraw-Hill
E. Balaguruswamy, Programming in ANSI C, Tata McGraw-Hill
Yashavant Kanetkar, Let Us C, BPB Publication.

Suggested Reference Books

Brian W. Kernighan and Dennis M. Ritchie, The C Programming Language, Prentice Hall of India.

Course code	ENV-101				
Category	Humanities and Social Sciences				
Course title	Basics of Environmental Science				
Scheme and Credits	L	T	P	Credits	
	2	0	0	2	
Class work/Practical	50Marks				
Exam	50Marks				
Total	100Marks				
Duration of Exam	03 Hours				

Course Objective:
To impart the knowledge and awareness for the environmental protection for real-time contribution during an execution of engineering practices in the society.

Unit 1
Environmental studies and Natural Resources:
Definition, scope and importance of environmental studies.
Natural Resources: Renewable and non-renewable resources, and associated problems
(a) Forest resources: Use and over-exploitation, deforestation, Timber extraction, mining, dams and their effects on forests and tribal people.
(b)Water resources: Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dam's benefits and problems.
(c) Mineral Resources: Use and exploitation, environmental effects of extracting and using mineral resources.
(d)Food Resources: World food problems, changes caused by agriculture and over grazing, effects of modern agriculture, fertilizers-pesticides problems, water logging, salinity.
(e) Energy Resources: Growing energy needs, renewable and non renewable energy sources, use of alternate energy sources.

Unit 2
Eco Systems:
Concept of an eco-system, Structure and function of an eco-system, Producers, consumers, decomposers, Energy flow in the ecosystems, Ecological succession, Food chains, food webs and ecological pyramids.
Introduction, types, characteristic features, structure and function of the following ecosystems:
(a) Forest ecosystem
(b) Grass land ecosystem
(c) Desert ecosystem
(d) Aquatic eco systems (ponds, streams, lakes, rivers, oceans, estuaries)

Unit 3

Environmental Pollution:

Definition, Causes, effects and control measures of;

(a) Air pollution

(b)Soil pollution

(c) Marine pollution

(d)Noise pollution

(e) Nuclear hazards

Disaster management: Floods, earth quake, cyclone and landslides.

Unit 4

Social issues and the Environment:

From unsustainable to sustainable development, Urban problems related to energy, Water conservation, rain water harvesting, watershed management.

Environmental ethics: issues and possible solutions, Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust. Environment protection Act, Air (prevention and control of pollution) Act, Water (prevention and control of pollution) Act, Wildlife protection Act, Forest conservation Act, Issues involved in enforcement of environmental legislations.

Recommended Books:

1. Textbook of Environmental studies, Erach Bharucha, UGC.

2. Fundamental concepts in Environmental Studies, D. D. Mishra, S Chand & Co Ltd.

Course Outcomes :

1.To understand the basic concepts of environmental studies and natural resources.

2. To learn about the various eco-systems of nature.

3. To gain knowledge about different types of environmental pollutions and their control measures.

4. To acquire the knowledge about the various social aspects related to the environment.

Course code	HSE-101P				
Category	Humanities and Social Sciences				
Course title	Communication Skills in English (P)				
Scheme and Credits	L	T	P	Credits	
	0	0	2	1	
Class work/ Practical	50 Marks				
Exam	50 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

Communication Skills in English (P)

Lab Activity: The students will acquire basic proficiency in English with special emphasis on listening, comprehension and speaking skills both at social and professional platforms.

(i) Listening comprehension
(ii) Recognition of phonemes in International Phonetic Alphabet
(iii) Self introduction and introduction of another person
(iv) Conversation and dialogues in common everyday situations
(v) Communication at work place (Standard phrases and sentences in various situations)
(vi) Telephonic communication
(vii) Speeches for special occasions (Welcome speeches, Introduction speeches, Felicitation speeches and Farewell speeches)
(viii) Tag Questions
(ix) Formal Presentations on literary texts prescribed in theory paper, Question Formation & Mock Press Conference

Course code	BSC-101P				
Category	BASIC SCIENCE COURSES				
Course title	Chemistry (P)				
Scheme and Credits	L	T	P	Credits	
	0	0	2	1	
External Practical	50 Marks				
Internal Practical	50 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

Course Objective:
The chemistry laboratory course will consist of experiments illustrating the principles of chemistry relevant to the study of science and engineering.

LIST OF EXPERIMENTS: -
1. Determination of surface tension of given liquid by drop number method.
2. Determine the viscosity of given liquid by using Ostwald's viscometer / Redwood viscometer.
3. Calculate the Rf value of given sample using Thin layer chromatography / Paper chromatography.
4. Removal of Ca^{2+} and Mg^{2+} hardness from given water sample using ion exchange column.
5. Determination of chloride content in given water sample.
6. Calculate the strength of strong acid by titrating it with strong base using conductometer.
7. Calculate the emf value of given cell.
8. To prepare the of urea formaldehyde and phenol formaldehyde resin.
9. To determine the rate constant of a reaction.
10. To Prepare iodoform.
11. Calculate the saponification value / acid value of given oil sample.
12. Chemical analysis of two anions and two cations in given sample of salt.
13. Determination of the partition coefficient of a substance between two immiscible liquids.
14. To determine the total hardness of given water sample by EDTA method.

Note: At least 08 experiments are to be performed by the students.

Suggested Books:
1. A Text book on Experiments and Calculation –Engineering Chemistry by S.S.Dara, S.Chand & Company Ltd.
2. Essentials of Analytical Chemisty, Shobha Ramakrishnan, Pearson Education.
3. Essential of Experimental Engineering chemistry, Shashi Chawla, Dhanpat Rai Publishing Co.
4. Theory & Practice Applied Chemistry – O.P.Virmani, A.K. Narula (New Age).
5. Engineering Chemistry, K.Sesha Maheswaramma and Mridula Chugh, Pearson Education.

Course code	EEE-101P				
Category	Engineering Science Course				
Course title	**Basics of Electrical and Electronics Engineering (P)**				
Scheme and Credits	L	T	P	Credits	
	0	0	2	1	
Class work	50 Marks				
Exam	**50 Marks**				
Total	**100 Marks**				
Duration of Exam	03 Hours				

Note: At least 8 experiments are to be performed by the students.

List of Subject related Experiments:

1. Verify that resistance of conductor is directly proportional to resistivity and length and inversely proportional to cross- sectional area of the conductor.

2. Verification of Ohm's Law, Kirchhoff current and voltage laws

3. Verification of temperature co-efficient of resistance: (i) Positive for Tungsten and Nichrome and (ii) Negative for carbon.

4. To measure DC voltage and current, AC voltage and current with multi-meter

5. To observe waveforms on oscilloscope, measure basic parameters amplitude and frequency of sine wave and square wave.

6. Obtain VI characteristics of semiconductor rectifier diode, LED, Photo-diode

7. To observe waveform at the output of half wave rectifier with and without filter capacitor.

8. To observe waveform at the output of full wave rectifier with and without filter capacitor.

9. To experimentally plot the input and output characteristics of a given BJT transistor in CE configuration and calculate its various parameters.
10. To experimentally plot the input and output characteristics of a given BJT transistor in CB configuration and calculate its various parameters.
11. To study the transfer and drain characteristics of JFET and calculate its various parameters.
12. To study the transfer and drain characteristics of MOSFET and calculate its various parameters.

Course code	CSE-101P				
Category	Professional Core Course				
Course title	Programming for Problem Solving Using C (P)				
Scheme and Credits	L	T	P	Credits	
	0	0	2	1	
Class work	50 Marks				
Exam	50 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

Note: At least 6 experiments are to be performed by the students.

List of Subject related Experiments:

Laboratory Outcomes

- To formulate the algorithms for simple problems
- To translate given algorithms to a working and correct program
- To be able to correct syntax errors as reported by the compilers
- To be able to identify and correct logical errors encountered at run time
- To be able to write iterative as well as recursive programs
- To be able to represent data in arrays, strings and structures and manipulate them through a program

Tutorial 1: Problem solving using computers:
Lab1: Familiarization with programming environment

Tutorial 2: Variable types and type conversions:
Lab 2: Simple computational problems using arithmetic expressions

Tutorial 3: Branching and logical expressions:
Lab 3: Problems involving if-then-else structures

Tutorial 4: Loops, while and for loops:
Lab 4: Iterative problems e.g., sum of series
Tutorial 5: 1D Arrays
Lab 5: 1D Array manipulation

Tutorial 6: 2D arrays and Strings
Lab 6: Matrix problems, String operations

Tutorial 7: Functions, call by value:
Lab 7: Simple functions

Course code	MEE - 104P				
Category	Engineering Science Course				
Course title	Engineering Drawing (P)				
Scheme and Credits	L	T	P	Credits	
	1	0	3	2.5	
Class work	50 Marks				
Exam	50 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

Course Outcomes:

On completion of this course, the students will be able to:

- Introduction to engineering design and its place in society
- Exposure to the visual aspects of engineering design
- Exposure to engineering graphics standards
- Exposure to solid modeling

UNIT-I

Module 1: Introduction to Engineering Drawing

Principles of Engineering Graphics and their significance, usage of Drawing instruments, lettering, Conic sections including the Rectangular Hyperbola (General method only); Cycloid, Epicycloid, Hypocycloid and Involute; Scales – Plain, Diagonal and Vernier Scales.

Module2: Orthographic Projections

Principles of Orthographic Projections-Conventions - Projections of Points and lines inclined to both planes; Projections of planes inclined Planes –Auxiliary Planes;

UNIT-II

Module3: Projections of Regular Solids

Those inclined to both the Planes- Auxiliary Views; Draw simple annotation, dimensioningand scale.Floor plans that include: windows, doors, and fixtures such as WC, bath, sink, shower, etc.

Module4: Sections and Sectional Views of Right Angular Solids

Prism, Cylinder, Pyramid, Cone – Auxiliary Views; Development of surfaces of RightRegular Solids - Prism, Pyramid, Cylinder and Cone; Draw the sectional orthographic views of geometrical solids, objects from industry and dwellings(foundation to slab only)

Module5: Isometric Projections

Principles of Isometric projection – Isometric Scale, Isometric Views, Conventions;Isometric Views of lines, Planes, Simple and compound Solids; Conversion of IsometricViewsto OrthographicViews andVice-versa,Conventions;

UNIT- III

Module6: Overview of Computer Graphics

Listing the computer technologies that impact on graphical communication, Demonstrating knowledge of the theory of CAD software [such as: The Menu System, Toolbars (Standard, Object Properties, Draw, Modify and Dimension), Drawing Area(Back ground, Crosshairs, Coordinate System),Dialog boxes and windows, Shortcut menus (Button Bars), The Command Line(where applicable),The Status Bar, Different methods of zoom as used in CAD, Select and eraseobjects.; IsometricViews of lines,Planes,Simple andcompound Solids]

UNIT-IV

Module7: Annotations, layering & other functions

Applying dimensions to objects, applying an notations to drawings; layers to create drawings, orthographic projection techniques; Drawing sectional views of composite right regular geometric solidsand project the true shape of the sectioned surface; Drawing annotation, Computer-aided design (CAD) software modeling of parts and assemblies.

Drawing of Engineering objects like coupling, crank shaft, pulley.

Module8: Demonstration of a simple team design project that illustrates

Geometry and topology of engineered components, Applying colour coding according to building drawing practice; Drawing sectional elevation showing foundation to ceiling; Introduction to Building Information Modelling (BIM).

SuggestedText/ReferenceBooks:

(i) Shah, M.B. & Rana B.C., Engineering Drawing, Pearson Education
(ii)Bhatt N.D., Panchal V.M. & Ingle P.R., (2014), Engineering Drawing, Charotar Publishing House
(iii) A grawal B. & Agrawal C. M.(2012), Engineering Graphics, TMH Publication
(iv) Narayana, K.L. & P Kannaiah (2008), Text book on Engineering Drawing, Scitech Publishers
(v) CAD Software Theory and User Manuals

Course code	MEE-102P				
Category	Engineering Science Course				
Course title	Workshop Practices (P)				
Scheme and Credits	L	T	P	Credits	
	1	0	3	2.5	
Class work	50 Marks				
Exam	50 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

Objectives of the course

1. To impart fundamental Knowledge of engineering practices such as fitting, wood working, foundry, machining, welding, etc. for manufacturing a product.
2. To prepare the students to understand the various tools and equipment's used in these processes and their working principle
3. To impart fundamental Knowledge of Lathe machine
4. To able to understand the basic knowledge of various welding processes

Class Work

Introduction:

Introduction to Manufacturing Processes and their Classification, Introduction to additive manufacturing, Industrial Safety.

Machining Shop

Lathe, description of lathe: headstock, tailstock, gearbox, carriage, apron, cutting speed, feed & depth of cut, cutting tools, Chucks: 3 jaw, 4 jaw.

Fitting shop:

Introduction, classification of metals: ferrous and nonferrous, fitting tools: measuring and marking tools, marking schemes for a fitting jobs, cutting tools.

Carpentry shop:

Introduction of carpentry, types of woods, carpentry tolls: measuring tools, marking tolls, cutting tools: saws, chisels, planning tools, drilling tools, striking tools, drilling tools, wood working joints, wood working lathe.

Foundry Shop

Introduction, foundry hand tools, measuring boxes, ladle, moulding, furnaces,Pattern: Types of Pattern and Allowances

Welding Shop

Introduction to welding, Classification of Welding Processes,Arc welding & Gas welding equipment's.

Reference Books:

1. S K Hajra Choudhury, Nirjhar Roy, A K Hajra Choudhury, Elements of workshop Technology (vol. 1&2), Media Promoters.
2. B S Raghuwanshi, A Course in Workshop Technology (manufacturing Process vol. 1& 2) Dhanpat Rai & CO.
3. O.P. Khanna, Workshop Technology. Dhanpat Rai Publication.
4. W A J Chapman, Workshop technology in SI unit (part – 1 &2), Mc Graw Hill Education.
5. M.P. GROOVER, Principles of Modern Manufacturing, Wiley.
6. Kalpakjian, Manufacturing Process for Engineering Materials, Pearson Education India.

Lab Work

List of Experiments

1. To study different types of measuring tools used in metrology and determine least counts of vernier callipers, micrometres and vernier height gauges.

2. To study different types of machine tools (lathe, shaper, planer, milling, drilling machines)

3. To prepare a job on a lathe involving like facing, outside turning, taper turning, step turning, radius making and parting-off.

4. To study different types of fitting tools and marking tools used in fitting practice.

5. To prepare a job made out of MS Flats, making saw – cut filling V-cut taper at the corners.

6. To prepare lay out on a metal sheet by making and prepare rectangular tray pipe shaped components e.g. funnel.

7. To prepare joints for welding suitable for butt welding and lap welding.

8. To study various types of carpentry tools and prepare simple types of at least two wooden joints.

9. To prepare simple engineering components/shapes by forging.

10. To prepare mold and core assembly.

11. To prepare horizontal surface/vertical surface/curved surface/slats or V-grooves on a shaper/planner.

12. To prepare a job involving side and face milling on a milling

13. To prepare a job on CNC Machine/Additive Manufacturing.

Note : At least eight experiments/jobs are to be performed/prepared by the students in the semester.

Gurugram University
Scheme of Studies and Examination
Bachelor of Technology (SCHEME A4) Semester-2

Sr. No.	Course Code	Course Title	Hours per week			Total Contact Hrs. per week	Credit
			L	T	P		
1.	BSM-104	Mathematics-II	3	1	0	4	4
2.	HSV-102	Human Value & Soft Skills	2	0	2	4	3
3.	EEE-101 OR BSC-101	Basics of Electrical and Electronics Engineering OR Chemistry	3	0	0	3	3
4.	BSP-103	Physics	3	1	0	4	4
5.	CEE-102	Civil Engineering Materials	3	1	0	4	4
6.	EEE-101P OR BSC-101P	Basics of Electrical and Electronics Engineering (P) OR Chemistry (P).	0	0	2	2	1
7.	BSP-103P	Physics (P)	0	0	2	2	1
8.	MEE-102P OR MEE-104P	Workshop Practices (P) OR Engineering Drawing	1	0	3	4	2.5
Total						**27**	**22.5**

Course code	BSM-104				
Category	Basic Science Course				
Course title	Mathematics-II				
Scheme and Credits	L	T	P	Credits	
	3	1	0	4	
Class work	30 Marks				
Exam	70 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

Objectives of the course

1. Demonstrate their understanding of mathematical ideas from multiple perspectives.
2. To develop logical understanding of the subject
3. To develop mathematical skill so that students are able to apply mathematical methods & principals in solving problem from Engineering fields.
4. To make aware students about the importance and symbiosis between Mathematics and Engineering.

Unit-I

Ordinary Differential Equations: Exact differential equations, Equations reducible to exact differential equations, Applications of differential equations of first order & first degree to simple electric circuits, Newton's law of cooling, Heat flow and Orthogonal trajectories, Linear Differential equations of second and higher order, Complete solution, Complementary function and Particular integral, Method of variation of parameters to find particular integral, Cauchy's and Legendre's linear equations.

Unit-II

Laplace Transforms and its Applications: Laplace transforms of elementary functions, Properties of Laplace transforms, Existence conditions, Transforms of derivatives, Transforms of integrals, Multiplication by tn , Division by t, Evaluation of integrals by Laplace transforms, Laplace transform of unit step function, Unit impulse function and Periodic function, Inverse transforms.

Unit-III

Partial Differential Equations: Formation of partial differential equations, Lagrange' linear partial differential equation, First order non-linear partial differential equation, Charpit's method, Method of separation of variables

Unit-IV

Basic Statistics: Measures of Central tendency: Mean, Median, Mode, Measures of Dispersion, Moments, Skewness and Kurtosis, Moments, Variance of a sum, Correlation coefficient, Correlation and regression – Rank correlation; Curve fitting by the method of least squares-fitting of straight lines, second degree parabolas and more general curves.

Reference Books:

1) G.B. Thomas and R.L. Finney, Calculus and Analytic geometry, Pearson Education.
2) Erwin kreyszig, Advanced Engineering Mathematics, John Wiley & Sons.
3) Ramana B.V., Higher Engineering Mathematics, Tata McGraw-Hill Publishing Company Limited.
4) B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers.
5) N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications.
6) P. Sivaramakrishna Das and C. Vijyakumari, Engineering Mathematics, Pearson Education.
7) W. E. Boyce and R. C. DiPrima, Elementary Differential Equations and Boundary Value Problems, Wiley India.
8) S. L. Ross, Differential Equations, Wiley India.
9) R. K, Jain and S. R. K. Iyengar, Advanced Engineering Mathematics, Narosa Publication House Private Limited

Course code	HSV-102				
Category	Humanities and Social Sciences				
Course title	Human Valuesand Soft Skills				
Scheme and Credits	L	T	P	Credits	
	2	0	2	3	
Class work/Practical	30 Marks				
Exam	70 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

Objectives of the course

a. The course aims at developing the desired English language skills of students of Engineering and Technology so that they become proficient in communication to excel in their professional lives. The course has been designed as to enhance their linguistic and communicative competence.
b. Understanding (Clarity) of Human Relationships and Family.
c. Exposure to Issues in Society and nature (larger manmade systems and Nature).

Unit: 1

Motivation and Objectives of Human Values Course, Purpose of Education, Complimentarily of skills and values, how the current education system falls short, Peers Pressure, Social Pressure In various dimensions of life, Concept of Competition and Time Management.

Unit: 2

Concept of Preconditioning, Concept of Natural Acceptance in Human Being, Understanding Relationships, Dealing with anger, Nine universal values in human relationships. Concept of prosperity, idea of Society, Idea of decentralization of politics, economics, education, justice etc., Its comparison with centralized systems, Balance in nature.

Unit: 3

Techniques of Good Writing , Writing self assessment tasks, Precis writing and note making. Paragraph and Essay writing, Article writing and summarizing

Unit: 4

Business Communication: Formal and Informal Letter writing, Statement of Purpose, Job application & CV (summary statement of academic & professional profiles) and Power point presentations through relevant slides.

English Lab Activity: Blog Writing/Creating a Newsletter, Script writing & enacting for a street play. Develop negotiating skills by using appropriate language of courtesy, Recording individual efforts and holding paired interactions and Group Discussions, Preparing and practising for Interviews.

Suggested reference books

Recommended Readings:

1. Bhatnagar, Nitin andMamtaBhatnagar.Communicative English for Engineers and Professionals.Pearson Education, 2013.
2. Swan, Michael.Practical English Usage. OUP, 1995.
3. Gangal, J.K. Practical Course in Spoken English. New Delhi: PHI Learning, 2015.
4. Konar,Nira. Communication Skills for Professionals. New Delhi: PHI Learning Pvt. Ltd., 2009.
5. Bansal, R.K. and J.B. Harrison. Spoken English. Orient Longman, 1983.
6. Sharma, Sangeeta and Binod Mishra. Communication Skills for Engineers and Scientists. Delhi: PHI Learning Pvt. Ltd., 20
7. Annie Leonard, `` The Story of Stuff,'' Free Press
8. Mohandas Karamchand Gandhi,`` The Story of My Experiments with Truth," Beacon Press
9. J Krishnamurthy,`` On Education," Official repository
10. Hermann Hesse ,`` Siddhartha," Bantam Books
11. ThichNhatHanh,`` Old Path White Clouds," Parallex Press
12. On Education - The Mother Aurobindo Ashram Publication

Course code	EEE-101				
Category	**Engineering Science Course**				
Course title	**Basics of Electrical and Electronics Engineering**				
Scheme and Credits	L	T	P	Credits	
	3	**0**	**0**	3	
Class work	**30 Marks**				
Exam	**70 Marks**				
Total	**100 Marks**				
Duration of Exam	**03 Hours**				

Objectives of the course

To provide basic knowledge of different elements of electrical and electronics engineering field.
To familiarize the students with the concepts of electrical circuits and network Analysis.

To understand the basics of AC and DC circuits.

To familiarize students to the analysis and design of analog electronic circuits which form the basic building blocks of almost any electronic system.

To introduce p-n junction theory, operation of the semiconductor devices and their use in basic electronic circuits.

Unit: 1
DC Circuits

Role and importance of circuits in Engineering, Concept of fields, charge, current, voltage, energy and their interrelationships. Electrical circuit elements (R, L and C), voltage and current sources(ideal & Controlled),series and parallel circuits, Network reduction: voltage and current division Kirchhoff current and voltage laws with their applications (Nodal and Mesh Analysis), Source transformation - star delta conversion. Superposition theorem, Thevenin and Norton Theorems, Millman,Substitution and Reciprocity theorem.

Unit: 2
AC Circuits

Representation of sinusoidal waveforms, average, peak and rms values, complex representation of impedance, phasor representation, complex power, real power, reactive power, apparent power, power factor and Energy, Analysis of single-phase ac circuits consisting of R, L, C, RL, RC, RLC combinations (series and parallel),Resonance; Introduction to three- phase circuits

Unit: 3

Introduction to p-n junction diode and its pplications. Half wave & full wave rectifiers. clipping and clamping circuits, Varactor, Varistor, Voltage Regulator

Bipolar junction transistors and its biasing BJT operation, BJT voltages and currents, CE, CB and CC characteristics, DC load line and bias point, base bias, emitter feedback bias, collector feedback bias, voltage divider bias, Thermal stability, biasing BJT switching circuits, transistor power dissipation and switching time, Testing of bipolar junction transistor with multi-meter, Reading datasheet of BJT.

Unit: 4

Field Effect Devices: JFET : basic Operation and characteristics, drain and transfer characteristics, pinch off voltage, parameters of JFET: Transconductance (gm), ac drain resistance (rd), amplification factor(μ) ,Small Signal Model & Frequency Limitations. MOSFET: basic operation, depletion and enhancement type, pinch-off voltage, Shockley equation and Small Signal Model of MOSFET, MOS capacitor.

Suggested books:

1. E. Huges, "Electrical Technology", ELBS.
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3. M.M. Mano: Digital Logic Design, Phi.

Suggested reference books

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3. A. Sedra and C. Smith, Microelectronic Circuits: Theory and Applications, Oxford University Press, 6th Edition, 2013.
4. Boylestad and Nashelsky, "Electronic Devices and Circuit Theory" Pearson publishers, 10th Edition
5. R.P. Jain: Modern Digital Electronics, Tmh.
6. Malvino and Leach, " Digital Principles and Applications", TMH publishers, 8th Edition
7. Tyagi M.S., "Introduction to Semiconductor Materials and Devices", John Wiley & Sons, 1993.
8. Basic Electrical Engineering, A.E. Fitzgerald , David Higginbotham 2009 , Arvin Grabel, Tata McGraw-Hill Publishing Company; 5th Edition.

Course code	BSC-101				
Category	BASIC SCIENCE COURSES				
Course title	Chemistry				
Scheme and Credits	L	T	P	Credits	
	3	0	0	3	
Class work	30Marks				
Theory Exam	70 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

Course Objective:

1. To analyse microscopic chemistry
2. Understand the concept of hardness of water and phenomenon of corrosion
3. Rationalise periodic properties
4. Distinguish the ranges of the electromagnetic spectrum

UNIT-I

Atomic and molecular structure: Schrodinger equation (Introduction and concept only). Forms of the hydrogen atom wave functions and the plots of these functions to explore their spatial variations (derivation excluded). Molecular orbital energy level diagrams of diatomic molecules. Pi-molecular orbitals of butadiene and benzene. Crystal field theory and the energy level diagrams for transition metal ions.

UNIT-III

Periodic properties: Effective nuclear charge, penetration of orbitals, variations of s, p, d and f orbital energies of atoms in the periodic table, electronic configurations, atomic and ionic sizes,ionization energies, electron affinity and electronegativity, polarizability, oxidation states.

UNIT-III

Stereochemistry: Representations of 3 dimensional structures, structural isomers and stereoisomers, configurations, symmetry and chirality, enantiomers, diastereomers, optical activity, absolute configurations and conformational analysis.

Organic reactions: Introduction to reactions involving substitution, addition, elimination, oxidation, reduction, cyclization (mechanism excluded).

UNIT-IV

Intermolecular forces: Ionic, dipolar and Van der Waals interactions.

Water Chemistry: Hardness of water- Introduction, Types, Measurement of hardness by EDTA method, Methods of water softening (Lime soda process, Zeolite Process, Demineralisation process).

Suggested Text Books:

(i) University Chemistry, Bruce M. Mahan, Pearson Education.
(ii) Chemistry: Principles and Applications, by M. J. Sienko and R. A. Plane
(iii) Essentials of Analytical Chemistry, Shobha Ramakrishnan and Banani Mukhopadhyay, Pearson Education.
(iv)Fundamentals of Molecular Spectroscopy, by C. N. Banwell
(v) Engineering Chemistry (NPTEL Web-book), by B. L. Tembe, Kamaluddin and M. S. Krishnan
(vi) Physical Chemistry, by P. W. Atkins
(vii) Organic Chemistry: Structure and Function by K. P. C. Volhardt and N. E. Schore, 5th Edition.

Course Outcomes:

The course will enable the student to:

- Analyse microscopic chemistry in terms of atomic and molecular orbitals and intermolecular forces.
- Understand the concept of hardness of water and phenomenon of corrosion.
- Distinguish the ranges of the electromagnetic spectrum used for exciting different molecular energy levels in various spectroscopic techniques.
- Rationalise periodic properties such as ionization potential, electronegativity, oxidation states and electron affinity.

Course code	BSP-103				
Category	**Basic Science Course**				
Course title	**Physics**				
Scheme and Credits	**L**	**T**	**P**	**Credits**	
	3	**1**	**0**	**4**	
Class work	**30 Marks**				
Exam	**70 Marks**				
Total	**100 Marks**				
Duration of Exam	**03 Hours**				

Objectives of the course

1. To impart knowledge of basic concepts in applied physics
2. To enhance the analytical capability of the engineering students.
3. To givea balance account of the fundamentals of Physics as well as some of recent developments in this area best suited to the Engineering applications in different branches and to provide the knowledge and methodology necessary for solving problems in the field of engineering.

UNIT – I

Electrostatics in vacuum and linear dielectric medium

Calculation of electric field and electrostatic potential for a charge distribution; Divergence and curl of electrostatic field; Laplace's and Poisson's equations for electrostatic potential Boundary conditions of electric field and electrostatic potential; energy of a charge distribution and its expression in terms of electric field. Electrostatic field and potential of a dipole. Bound charges due to electric polarization; Electric displacement; boundary conditions on displacement.

UNIT – II

Electromagnetism and Magnetic Properties of Materials

Laws of electrostatics, electric current and the continuity equation, laws of magnetism. Ampere's Faraday's laws. Maxwell's equations. Polarisation, permeability and dielectric constant, polar and non-polar dielectrics, applications of dielectric Magnetisation, permeability and susceptibility, classification of magnetic materials, ferromagnetism, magnetic domains and hysteresis, applications.

UNIT – III

Wave Optics and Lasers

Wave Optics: Huygens' principle, superposition of waves and interference of light by wave-front splitting and amplitude splitting; Young's double slit experiment, Newton's rings, Michelson interferometer. Fraunhofer diffraction from a single slit and a circular aperture, the Rayleigh criterion for limit of resolution and its application to vision; Diffraction gratings and their resolving power.

Lasers: Einstein's theory of matter radiation interaction and A and B coefficients; amplification of light by population inversion, different types of lasers: gas lasers (He-Ne, CO), solid-state lasers (ruby, Neodymium), dye lasers; Properties of laser beams: mono-chromaticity.

UNIT – IV

Introduction to Solids and Semiconductors

Free electron theory of metals, Fermi level, density of statesin1, 2 and 3 dimensions, Bloch's theorem for particles in a periodic potential, Kronig-Penney model and origin of energy bands. Types of electronic materials: metals, semiconductors, and insulators. Intrinsic and extrinsic semiconductors, Dependence of Fermi level on carrier-concentration and temperature (equilibrium carrier statistics), Carrier generation and recombination, Carrier transport: diffusion and drift, p -n junction.

Suggested reference books

1. E. Hecht, "Optics", Pearson Education
2. D. J. Griffiths, "Quantum mechanics", Pearson Education
3. B.G. Streetman, "Solid State Electronic Devices", Pearson Education
4. G. Main, "Vibrations and waves in physics", Cambridge University Press
5. H. J. Pain, "The physics of vibrations and waves", Wiley
6. A. Ghatak, "Optics", McGraw Hill Education,
7. O. Svelto, "Principles of Lasers", Springer Science & Business Media,
8. R. Robinett, "Quantum Mechanics", OUP Oxford
9. D. McQuarrie, "Quantum Chemistry", University Science Books
10. D. A. Neamen, "Semiconductor Physics and Devices", Times Mirror High Education Group, Chicago
11. E.S. Yang, "Microelectronic Devices", McGraw Hill, Singapore

Course code	CEE-102				
Category	Program Core Course				
Course title	CIVIL ENGINEERING MATERIALS				
Scheme and Credits	L	T	P	Credits	
	3	1	0	4	
Class work	30 Marks				
Exam	70 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

COURSE OUTCOMES

Upon successful completion of the course, students should be able to:

1. Understand the properties of different types of cement.
2. Design concrete mixes and conduct tests on cement and aggregates.
3. Use different types of special concretes in construction of structures.
4. Understand and use properties of bricks, stones, wood in building construction, properties of flyash, paints, varnishes, gypsum and water proofing materials in building constructions.

UNIT-1

Cement: Compounds and prepositions, types of Portland cement, pozzolaniccement , high alumina cementand other types, hydration mechanism and hydration products, setting and hardening, curing,strength of hardened cement, grade of cement, tests on cements, relevant BIS codes.

UNIT-II

Aggregates: Properties of coarse& fine aggregates, tests on aggregates, relevant BIS codal provisions, concrete: Ingredients of concrete, properties of fresh and hardened concrete, strength of concrete, W/C ratio of porosity, additives and their types, concrete mix design.

UNIT-III

Special Concretes: Reinforced cement concrete, polymer concrete, fibre reinforced concrete, ferrocement, light weightconcrete, roller compacted concrete, ready mix concrete, self compacting concrete, high performance concrete, bacterial concrete.

UNIT-IV

Bricks, Stones& Other materials: Forms of bricks, properties of bricks and stones, tests on bricks and stones, relevant BIS codes, timber: structure of wood, defects in timber, seasoning, preservation, plywood and its manufacturing. Fly ash paints & varnishes, gypsum, tar, bitumen & asphalt, nano materials, smart materials,composite materials, geosynthetics, heat & sound insulating materials, water proofing materials.

Textbook:

1. Building Materials by S.K. Duggal
2. Engineering Materials by S.C. Rangwala
3. Concrete Technology by M L Gambhir
4. Properties of concrete by A M Neville

Reference Books:

1. Engineering Materials by R K Rajput
2. Civil Engineering Materials by Neil Jackson
3. Design of concrete mixes by Krishna Raju N, CBS publishers
4. Concrete Technology by Neville A.M and Brooks. J.J. PEARSON education.
5. Concrete properties and manufacturing by Akroyd T.N.W, Pergamon press

Course code	EEE-101P				
Category	Engineering Science Course				
Course title	**Basics of Electrical and Electronics Engineering (P)**				
Scheme and Credits	L	T	P	Credits	
	0	0	2	1	
Class work	50 Marks				
Exam	**50 Marks**				
Total	**100 Marks**				
Duration of Exam	03 Hours				

Note: At least 8 experiments are to be performed by the students.

List of Subject related Experiments:

1. Verify that resistance of conductor is directly proportional to resistivity and length and inversely proportional to cross- sectional area of the conductor.

2. Verification of Ohm's Law, Kirchhoff current and voltage laws

3. Verification of temperature co-efficient of resistance: (i) Positive for Tungsten and Nichrome and (ii) Negative for carbon.

4. To measure DC voltage and current, AC voltage and current with multi-meter

5. To observe waveforms on oscilloscope, measure basic parameters amplitude and frequency of sine wave and square wave.

6. Obtain VI characteristics of semiconductor rectifier diode, LED, Photo-diode

7. To observe waveform at the output of half wave rectifier with and without filter capacitor.

8. To observe waveform at the output of full wave rectifier with and without filter capacitor.

9. To experimentally plot the input and output characteristics of a given BJT transistor in CE configuration and calculate its various parameters.
10. To experimentally plot the input and output characteristics of a given BJT transistor in CB configuration and calculate its various parameters.
11. To study the transfer and drain characteristics of JFET and calculate its various parameters.
12. To study the transfer and drain characteristics of MOSFET and calculate its various parameters.

Course code	BSC-101P				
Category	BASIC SCIENCE COURSES				
Course title	Chemistry (P)				
Scheme and Credits	L	T	P	Credits	
	0	0	2	1	
External Practical	50 Marks				
Internal Practical	50 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

Course Objective:
The chemistry laboratory course will consist of experiments illustrating the principles of chemistry relevant to the study of science and engineering.

LIST OF EXPERIMENTS: -
1. Determination of surface tension of given liquid by drop number method.
2. Determine the viscosity of given liquid by using Ostwald's viscometer / Redwood viscometer.
3. Calculate the Rf value of given sample using Thin layer chromatography / Paper chromatography.
4. Removal of Ca^{2+} and Mg^{2+} hardness from given water sample using ion exchange column.
5. Determination of chloride content in given water sample.
6. Calculate the strength of strong acid by titrating it with strong base using conductometer.
7. Calculate the emf value of given cell.
8. To prepare the of urea formaldehyde and phenol formaldehyde resin.
9. To determine the rate constant of a reaction.
10. To Prepare iodoform.
11. Calculate the saponification value / acid value of given oil sample.
12. Chemical analysis of two anions and two cations in given sample of salt.
13. Determination of the partition coefficient of a substance between two immiscible liquids.
14. To determine the total hardness of given water sample by EDTA method.

Note: At least 08 experiments are to be performed by the students.

Suggested Books:
1. A Text book on Experiments and Calculation –Engineering Chemistry by S.S.Dara, S.Chand & Company Ltd.
2. Essentials of Analytical Chemisty, Shobha Ramakrishnan, Pearson Education.
3. Essential of Experimental Engineering chemistry, Shashi Chawla, Dhanpat Rai Publishing Co.
4. Theory & Practice Applied Chemistry – O.P.Virmani, A.K. Narula (New Age).
5. Engineering Chemistry, K.Sesha Maheswaramma and Mridula Chugh, Pearson Education.

PHYSICS Lab

Course code	BSP-103P				
Category	**Basic Science Course**				
Course title	**Physics (P)**				
Scheme and Credits	**L**	**T**	**P**	**Credits**	
	0	**0**	**2**	**1**	
Class work	**50 Marks**				
Exam	**50 Marks**				
Total	**100 Marks**				
Duration of Exam	**03 Hours**				

Note: At least 8 experiments are to be performed by the students.

List of Subject related Experiments:

1. To find out wavelength of monochromatic light using Newton's ring experiment.
2. To find out wavelength of monochromatic light using Diffraction grating.
3. To find out wavelength of monochromatic light using Freshnel's bi-prism
4. To study interference phenomena using Michelson's Interferometer and to find out wavelength of monochromatic light.
5. To study Hall effect in semiconductors and measure the Hall coefficient.
6. To find frequency of AC mains using sonometer.
7. To study the magnetic properties of materials using B-H curve.
8. To study the Curies temperature of materials using Dielectric set up.
9. To verify the inverse square law with the help of a photovoltaic cell.
10. To determine Planks constant using photocell.
11. To study the characteristics of Solar cell and find out the fill factor.
12. To find temperature co-efficient of platinum using Callender Griffith bridge.
13. To study the forward and reverse characteristics of P-N junction diode.

Course code	MEE-102P				
Category	Engineering Science Course				
Course title	Workshop Practices (P)				
Scheme and Credits	L	T	P	Credits	
	1	0	3	2.5	
Class work	50 Marks				
Exam	50 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

Objectives of the course

5. To impart fundamental Knowledge of engineering practices such as fitting, wood working, foundry, machining, welding, etc. for manufacturing a product.
6. To prepare the students to understand the various tools and equipment's used in these processes and their working principle
7. To impart fundamental Knowledge of Lathe machine
8. To able to understand the basic knowledge of various welding processes

Class Work

Introduction:

Introduction to Manufacturing Processes and their Classification, Introduction to additive manufacturing, Industrial Safety.

Machining Shop

Lathe, description of lathe: headstock, tailstock, gearbox, carriage, apron, cutting speed, feed & depth of cut, cutting tools, Chucks: 3 jaw, 4 jaw.

Fitting shop:

Introduction, classification of metals: ferrous and nonferrous, fitting tools: measuring and marking tools, marking schemes for a fitting jobs, cutting tools.

Carpentry shop:

Introduction of carpentry, types of woods, carpentry tolls: measuring tools, marking tolls, cutting tools: saws, chisels, planning tools, drilling tools, striking tools, drilling tools, wood working joints, wood working lathe.

Foundry Shop

Introduction, foundry hand tools, measuring boxes, ladle, moulding, furnaces,Pattern: Types of Pattern and Allowances

Welding Shop

Introduction to welding, Classification of Welding Processes,Arc welding & Gas welding equipment's.

Reference Books:

7. S K Hajra Choudhury, Nirjhar Roy, A K Hajra Choudhury, Elements of workshop Technology (vol. 1&2), Media Promoters.
8. B S Raghuwanshi, A Course in Workshop Technology (manufacturing Process vol. 1& 2) Dhanpat Rai & CO.
9. O.P. Khanna, Workshop Technology. Dhanpat Rai Publication.
10. W A J Chapman, Workshop technology in SI unit (part – 1 &2), Mc Graw Hill Education.
11. M.P. GROOVER, Principles of Modern Manufacturing, Wiley.
12. Kalpakjian, Manufacturing Process for Engineering Materials, Pearson Education India.

Lab Work

List of Experiments

1. To study different types of measuring tools used in metrology and determine least counts of vernier callipers, micrometres and vernier height gauges.

2. To study different types of machine tools (lathe, shaper, planer, milling, drilling machines)

3. To prepare a job on a lathe involving like facing, outside turning, taper turning, step turning, radius making and parting-off.

4. To study different types of fitting tools and marking tools used in fitting practice.

5. To prepare a job made out of MS Flats, making saw – cut filling V-cut taper at the corners.

6. To prepare lay out on a metal sheet by making and prepare rectangular tray pipe shaped components e.g. funnel.

7. To prepare joints for welding suitable for butt welding and lap welding.

8. To study various types of carpentry tools and prepare simple types of at least two wooden joints.

9. To prepare simple engineering components/shapes by forging.

10. To prepare mold and core assembly.

11. To prepare horizontal surface/vertical surface/curved surface/slats or V-grooves on a shaper/planner.

12. To prepare a job involving side and face milling on a milling

13. To prepare a job on CNC Machine/Additive Manufacturing.

Note : At least eight experiments/jobs are to be performed/prepared by the students in the semester.

Course code	MEE - 104P				
Category	Engineering Science Course				
Course title	Engineering Drawing (P)				
Scheme and Credits	L	T	P	Credits	
	1	0	3	2.5	
Class work	50 Marks				
Exam	50 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

Course Outcomes:

On completion of this course, the students will be able to:

- Introduction to engineering design and its place in society
- Exposure to the visual aspects of engineering design
- Exposure to engineering graphics standards
- Exposure to solid modeling

UNIT-I

Module 1: Introduction to Engineering Drawing

Principles of Engineering Graphics and their significance, usage of Drawing instruments, lettering, Conic sections including the Rectangular Hyperbola (General method only); Cycloid, Epicycloid, Hypocycloid and Involute; Scales – Plain, Diagonal and Vernier Scales.

Module2: Orthographic Projections

Principles of Orthographic Projections-Conventions - Projections of Points and lines inclined to both planes; Projections of planes inclined Planes –Auxiliary Planes;

UNIT-II

Module3: Projections of Regular Solids

Those inclined to both the Planes- Auxiliary Views; Draw simple annotation, dimensioning and scale. Floor plans that include: windows, doors, and fixtures such as WC, bath, sink, shower, etc.

Module4: Sections and Sectional Views of Right Angular Solids

Prism, Cylinder, Pyramid, Cone – Auxiliary Views; Development of surfaces of Right Regular Solids - Prism, Pyramid, Cylinder and Cone; Draw the sectional orthographic views of geometrical solids, objects from industry and dwellings(foundation to slab only)

Module5: Isometric Projections

Principles of Isometric projection – Isometric Scale, Isometric Views, Conventions; Isometric Views of lines, Planes, Simple and compound Solids; Conversion of Isometric Views to Orthographic Views and Vice-versa, Conventions;

UNIT- III

Module6: Overview of Computer Graphics

Listing the computer technologies that impact on graphical communication, Demonstrating knowledge of the theory of CAD software [such as: The Menu System, Toolbars (Standard, Object Properties, Draw, Modify and Dimension), Drawing Area(Back ground, Crosshairs, Coordinate System),Dialog boxes and windows, Shortcut menus (Button Bars), The Command Line(where applicable),The Status Bar, Different methods of zoom as used in CAD, Select and eraseobjects.; IsometricViews of lines,Planes,Simple andcompound Solids]

UNIT-IV

Module7: Annotations, layering & other functions

Applying dimensions to objects, applying an notations to drawings; layers to create drawings, orthographic projection techniques; Drawing sectional views of composite right regular geometric solids and project the true shape of the sectioned surface; Drawing annotation, Computer-aided design (CAD) software modeling of parts and assemblies.

Drawing of Engineering objects like coupling, crank shaft, pulley.

Module8: Demonstration of a simple team design project that illustrates

Geometry and topology of engineered components, Applying colour coding according to building drawing practice; Drawing sectional elevation showing foundation to ceiling; Introduction to Building Information Modelling (BIM).

Suggested Text/Reference Books:

(vi) Shah, M.B. & Rana B.C., Engineering Drawing, Pearson Education
(vii) Bhatt N.D., Panchal V.M. & Ingle P.R., (2014), Engineering Drawing, Charotar Publishing House
(viii) A Grawal B. & Agrawal C. M.(2012), Engineering Graphics, TMH Publication
(ix) Narayana, K.L. & P Kannaiah (2008), Text book on Engineering Drawing, Scitech Publishers
(x) CAD Software Theory and User Manuals